THE
ESSENTIALS OF HEALTHFUL LIVING

OTHER BOOKS BY DR. SADLER

THE SCIENCE OF LIVING; OR, THE ART OF KEEPING WELL
THE CAUSE AND CURE OF COLDS
THE PHYSIOLOGY OF FAITH AND FEAR; OR, THE MIND IN HEALTH AND DISEASE
WORRY AND NERVOUSNESS; OR, THE SCIENCE OF SELF-MASTERY
THE MOTHER AND HER CHILD
HOW TO REDUCE AND HOW TO GAIN
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WHAT A SALESMAN SHOULD KNOW ABOUT HIS HEALTH
THE TRUTH ABOUT SPIRITUALISM
THE TRUTH ABOUT MIND CURE
HOW TO FEED THE BABY
THE TRUTH ABOUT HEREDITY
PERSONALITY AND HEALTH

THE ESSENTIALS OF HEALTHFUL LIVING

BY

C

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DEDICATED

TO

THE MEMORY OF PASTEUR,

A PIONEER IN DISEASE PREVENTION

PREFACE

It is an old saying and a true saying that "an ounce of prevention is worth a pound of cure." However important the knowledge that leads to the successful treatment of disease, still more important must be that information which would have enabled us to prevent disease.

By the dawn of the twentieth century a vast body of knowledge had accumulated in medicine and its allied sciences, having to do with disease prevention. At the present time this data has been sifted and so classified as to enable us to present to the layman a concise story dealing with practical and successful methods of disease prevention.

This volume deals with personal and general hygiene, with the practical methods of preventing disease by the regulation of our personal health practices on the one hand and the proper carrying out of community and public hygiene on the other hand.

It is in this realm of personal hygiene that we encounter so many features and practices which are to some extent debatable. In the discussion of disputed ground, I have tried to take the course that would avoid faddish teachings and extreme attitudes.

While I have consulted and am indebted to the vast body of literature respecting hygiene and disease prevention available at the present time, the views herein expressed represent my attitude on, and experience with, the various phases of personal hygiene and public sanitation. In a popular work of this sort it has not been deemed wise to encumber the text with numerous citations of authorities consulted or quoted, although I am indebted to a vast number of standard works and periodical contributions which have been consulted in the preparation of this volume.

I believe that an up-to-date work, telling in simple language, the story of disease prevention, will be acceptable as a part of the educational campaign to make the layman intelligent respect-

ing his own health and its preservation; and if this work can contribute something to the movement on foot at the present to arouse the hygienic and health consciousness of the American people, I shall be more than repaid for the efforts entailed in its preparation.

William S. Sadler.

533 Diversey Parkway, Chicago.
January, 1925.

INTRODUCTION

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INTRODUCTION

While reading this manuscript, I also read Balfour's *Tropical Hygiene,* and Dr. W. E. Deeks' Report for 1923 to the United Fruit Company on the health of the Fruit Company's employees in various Central American countries. Balfour wrote of the health conditions in Egypt and in other countries in Africa, and of various Caribbean Islands. Both books continually record observations to the effect that but little can be accomplished in a health way until the people themselves become informed about personal and community health, and have an active interest. Balfour speaks of the hopelessness of even a strong and efficient government's accomplishing much among a people who are not in understanding sympathy with health work. It is impossible for even autocratic authority to impose Twentieth Century health standards on a people who, in all other ways, are living on an Eighteenth Century basis.

In Dr. Deeks' report, there occur many statements like the following: "It is useless to screen the houses of any but the better educated. If it were possible to obtain that co-operation which can rightfully be expected in an educated community, the problem of disease prevention would be greatly simplified." One cause of the great prevalence of pneumonia is said to be "an exaggerated carelessness amounting to utter disregard of personal hygiene. These people are wholly ignorant of the importance of maintaining those conditions essential to their health and vitality."

Health cannot be greatly improved from above downward. Unless the ground is first prepared, the seeds will not sprout, or if they do, the young plants will wither. Frankel has said the average length of human life could be increased fifteen years, if men would only apply what is already known.

There is need for research work. There are principles and facts to be discovered. The research spirit in a group of health workers makes everybody do better work. Even the janitor catches the spirit of it and cleans out his waste jars in a new

spirit. We rightly honor the men who invent, create, and discover, but I very much doubt if they are as serviceable to their fellow men as are those who popularize and educate. These latter prepare the soil, and without their preparation there would be no crop. The essential difference between our situation and those described by Doctors Balfour and Deeks is that our people have been prepared; our soil is ready.

Men are rewarded for the courage which pioneering requires. The research man who breaks out into the unknown displays no more mental and moral courage than does the man who breaks away from the beaten path and undertakes to educate and interest the general public in personal and community hygiene. In this vineyard, no laborer has served longer nor more forcibly than Dr. William S. Sadler. In addition to the spoken word and personal contacts, he periodically puts into book form some of the things which he believes in. This volume is one of a group each of which is intended for the lay reader, and which will interest him, and can be absorbed and assimilated by him.

W. A. Evans.

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CHAPTER I

THE DAWN OF PREVENTIVE MEDICINE

For centuries physicians have concerned themselves with the treatment of disease and the relief of suffering, but only in the last few decades have medical men turned their serious attention to the *prevention of disease.* For too long a time, men of science have been concerned with the phenomena of birth and death more than with those laws of biologic living which would enable the individual to enjoy better health and to live longer.

Whatever our shortcomings in health matters today, one thing is certain—a larger number of people live longer than their ancestors.

There is little excuse for people dying nowadays from the causes that formerly prevailed. In this country at least, few starve to death; wealth is fairly abundant, food and raiment plentiful, and shelter universally provided. With the increase of wealth, and opportunities for the enjoyment of life, more attention is being paid to its preservation—to the prevention of disease. Preventive medicine is becoming established as a science. Conservation of health is becoming a national slogan. The health consciousness of the American people is gradually awaking.

BUYING HEALTH

Someone has said, "You can buy everything for money except health and religion." This statement may be true regarding religion, but it is not strictly true as concerns health. The knowledge, the principles and the skill concerned in the prevention of disease and the promotion of health, can actually be bought; just as the reader may have purchased this book and herein will find instruction which perchance may result in the prevention of disease, the lessening of suffering, the promotion of health, and even the prolongation of life itself.

Of course, health cannot be bought when it is too late. In matters of hygiene, it is of little use to "lock the barn after the horse is stolen."

When we say that health can be purchased, we do not mean that an individual can go, as it were, to the hygienic market place, and personally and for himself, buy health. We refer more especially to the health of a community, of a city, state or nation. We know it is a fact that if we supply the health authorities of any community with proper funds, and authorize them to put forth adequate efforts—well, we know that the health of the community can be improved in one year, five years, ten years, and so on.

It is surprising what results in health improvement the authorities can make with such small sums as we give them. In years gone by, in Chicago, we have been in the habit of each year giving our health commissioner about twenty-five cents apiece—sometimes more, sometimes less—for taking care of us, and we certainly have received large dividends on this small investment, as the lessened death rate in Chicago in the past generation has resulted in the saving of over forty lives a day. If we would increase our investments for the purchase of health—both in an individual and in a community sense—we certainly could increase the amount of health we would all enjoy.

When we object to paying taxes for health promotion purposes, we are pursuing a policy that is indeed "penny wise and pound foolish"; for it is cheaper to prevent than cure, when one comes to consider sickness, suffering, time lost, doctors' fees, and undertakers' bills.

HEALTH TEACHINGS OF THE SEERS

Moses was a great sanitarian, one of the oldest accredited health teachers. He clearly recognized the relation of cause and effect in the problems of health and disease. He regarded the ability to cure disease as extra-human; his view was expressed in the statement: "I am the Lord that healeth thee." (Ex. 15:26.)

The Psalmist taught that health followed the knowledge of the Divine way when he said: "God be merciful unto us and bless us; and cause his face to shine upon us; that thy way may be known upon earth, thy saving health among all nations." (Ps. 67:1-2.)

Solomon was a practical dietitian—his wisdom extended to the realm of personal hygiene—he understood the curse of gluttony. He said: "Blessed art Thou, O land, when thy king is the son of nobles and thy princes eat in due season, for strength and not for drunkenness." (Eccl. 10:17.)

Jeremiah said of the Lord that "He doth not afflict willingly." (Lam. 3:33.) The New Testament writers recognized the same sacredness of the laws of health and the sanctity of the human body. Paul taught that "Whatsoever a man soweth, that shall he also reap." (Gal. 6:7.)

Paul seems to have had a very clear conception regarding the relation of things physical and spiritual. He said: "What! Know ye not that your body is the Temple of the Holy Ghost which is in you, and ye are not your own? For ye are bought with a price; therefore glorify God in your body and in your spirit, which are God's." (I Cor. 6:19, 20.)

Little wonder that Paul, holding such lofty ideas and ideals of physical health and spiritual living, should have reached the conclusion that man's duty was summed up in the statement: "Whether, therefore, ye eat or drink or whatsoever ye do, do all to the glory of God." (I Cor. 10:31.)

ANCIENT SANITATION

The science of sanitation goes back to the dawn of history—back to those wonderful civilizations of five or six thousand years ago. The early beginnings of sanitary science and preventive medicine are to be found in Assyria and Babylonia, Egypt and Crete, Greece and Rome.

One of the earliest known civilizations was probably that of the ancient Summerians, who inhabited the broad valley north of the Persian Gulf between the Tigris and Euphrates rivers, now called Mesopotamia. Recent excavations have shown that the dwellings of these people were provided with drains and other sanitary conveniences. Since the country was flat and the soil sandy, the work was individual and not a community enterprise. No attempt was made to build sewers for these municipalities of six thousand years ago, but each householder constructed his own drain and cesspool after the manner of the Arabians of the present day.

One writer suggests that "The Egyptians worshipped the scarabæus, or dung beetle, possibly recognizing its scavenging powers and its contribution to sanitation." Heroditus tells us

that the Egyptians kept their houses clean, bathed frequently, and attempted to obtain unpolluted water for drinking purposes.

But the ancient Hebrews were the real founders of the modern public health movement. The *laws of Moses* (born about 1600 B.C.) contain numerous hygienic laws and ordinances, most of which apply just about as well to-day as they did when they were first promulgated. The influence of Egyptian learning on Moses and his work is suggested by a Biblical passage which says: "And Moses was learned in all the wisdom of the Egyptians and was mighty in words and deeds." (Acts 8:22.)

The ancient city of Jerusalem was well sewered and had a good water supply. Previous to the eighth century before Christ the city had two aqueducts, one from the pools of Solomon and the other from the pools of Hezekiah, outside the city walls. In 727 B.C. King Hezekiah built a vast reservoir, called the pool of Siloam, near the gates of Jerusalem. The existing water supply was insufficient to fill it, so he constructed a tunnel through the solid rock of a hill behind the city. His workmen began at both ends and met accurately in the middle.

The most extensive and elaborate sanitary engineering of olden times has been recently brought to light on the island of Crete, where a palace, which dates from about 2100 B.C., has a wonderfully complete system of drainage.

Cyrus (559-529 B.C.) was a wise commander and is said always to have taken provisions and drinking water from home when on his military campaigns. He had the water boiled, suggesting that the value of this common process of sterilization was known even to these ancient peoples.

In America the oldest evidence of sanitary science is given by the wells along the valley of the Mississippi, which are believed to have been built by primitive peoples many centuries before Christ. Other wells are found in Central America. "One in particular in the hills of Yucatan is worthy of mention because it is bored to a depth of 100 feet and then through a horizontal gallery 2,700 feet long before water is reached."

In 625 B.C. an engineer named *Eupalinius* constructed a tunnel 4,200 feet long and eight feet square in order to supply water to the city of Athens. The first sanitary engineering

from Rome and Carthage was probably performed by Greek engineers, as the designs of all are similar.

Hippocrates advocated the boiling or filtering of all drinking water.

Much of Roman engineering was devoted to sanitation. The city of Rome had sewers as early as 800 B.C. In 735 B.C. was built the famous Cloaca Maxima, which is still in use as a sub-soil drain, 2,659 years later. It is 12 feet high, 11 feet wide and is lined with cement. Every Roman street had its lateral sewer diminishing in size as the distance from the main sewer increased. The great aqueducts of Rome are monuments to the genius of their engineers. Like the sewers, some of them are still in use.

THE DAWN OF SANITARY SCIENCE

With the discovery of the microscope the modern era of preventive medicine and sanitary science was ushered in. The dawn of modern medicine dates from our ability to recognize, cultivate, and study microbes. The germ theory of disease effected a complete revolution in sanitary methods and pointed a way for those magnificent achievements in disease prevention which so increasingly characterized the sanitary efforts of the nineteenth century, particularly its closing decades.

Public health administration, with all its details of quarantine regulation and contagious disease control, in fact the whole far-flung battle-front, in the struggle against contagious diseases and infectious disorders, had been brought up to a point of high efficiency and extraordinary accomplishment by the dawn of the twentieth century.

For untold ages the microbe had reigned almost supreme and had worked at will its mischievous career on earth; but the moment the struggle became one of the microbe versus the microscope, the death knell of the supremacy of germ diseases was sounded, and although the battle is not yet completely won, the past half century has been marked by a succession of brilliant achievements on the part of a long list of untiring investigators who, when we consider the value of their work, in the terms of human lives saved, could be appropriately denominated "The uncrowned heroes of health."

This new modern era of preventive medicine has not only been characterized by the extraordinary development of sani-

tary engineering and other methods of fighting the so-called "filth diseases," but it has likewise been instrumental in bringing about tremendous advances in the realms of personal hygiene, industrial hygiene, and other phases of public health improvement. These activities have reached out to embrace such matters as prevention of food adulteration; improvement of both water and milk supply; improved plumbing, and sewage disposal; the combating of flies, dust, and other forms of atmospheric contamination; the improvement of sanitary conditions in both workrooms and living apartments; not to mention the tremendous advances in the sanitary and health management of the early years of child life, which has so enormously cut down the frightful infant mortality of fifty years ago.

Modern hygienic and sanitary teaching, as now so freely popularized and made accessible to the general public, has brought us the knowledge of the causation of the majority of ordinary diseases, and has both pointed out the method of their mastery and designated the practical steps to be taken by both the individual and the public as a whole, in order to effect their speedy and more or less complete subjugation as menaces to human health and efficiency.

The microscope demonstrated the cause of the contagious diseases, and the development of modern science has clearly pointed out the path of deliverance; and we have every reason to hope that in the near future those diseases which have so far defied all scientific efforts to bring about their overthrow will soon have their microbic or other causes disclosed—which discovery will in turn enable us to formulate and put in operation successful methods of attack.

LOOKING BACKWARD

There is no doubt but that some tribes of the human race used to live much longer than we do now. There are in history some remarkable accounts of longevity. We not only know they had giants in ancient times because of the records, but we find their skeletons and so we know the records are more or less accurate. Of an ancient king, about 1500 B.C., we read: "For only Og, king of Bashan, remained of the remnant of giants; behold, his bedstead was a bedstead of iron; is it not in Rabbath of the children of Ammon? Nine cubits the length thereof, and four cubits the breadth of it,

after the cubit of a man." (Deut. 3:11.) Now according to the reference tables, a cubit of that time is 18 inches. This would make King Og's bed about 13½ feet in length. Another quotation from the Good Book sheds light on the physical condition of the Jewish people. About the middle of the 15th century B.C., the Psalmist says. "He brought them forth also with silver and gold; and there was not one feeble person among their tribes." (Ps. 105:37.)

Abraham, the father of the Jewish people, lived to be 175 years of age, according to the records. Pliny tells of an Italian district which had 130 persons over 100 years of age: 57 were over 110, 2 persons were 125 years old, 4 were 130, 4 were 135, and there were 3 people in the community who were 140 years of age. John Korin, a Hungarian, even in comparatively recent times, lived to the extraordinary age of 172 years, while a woman died in Moscow, in 1848, who was 168 years old. In 1670 Henry Jenkin, an Englishman, died at 169. J. Neffingham, also an Englishman, died in 1757 at 144, while Lord Raleigh is authority for the statement that the Countess Desmond appeared in court in 1614, hale and hearty at the age of 149 years.

Thomas Parr, familiarly known as "old Parr," a native of Scotland, who lived a healthy and uneventful life up to the age of 152 years, was then discovered by an English count who, because of his great age, took him to London to exhibit him to his friends. Charles the First heard of this remarkable subject and brought him to the court, where, after a sumptuous feast, old Parr promptly died of indigestion, but not from old age, as the post-mortem examination showed no signs at all of physical degeneration.

It seems that *Seneca* was not far wrong when he said: "Man does not die, he kills himself." Many of the early Christian fathers, who limited themselves to a most frugal diet, consisting mainly of bread and water, attained to a remarkable age. St. Anthony lived one hundred and five years; James the Hermit, one hundred and four years; Arsenius, the tutor of the Emperor Arcadius, one hundred and twenty years; St. Epiphanius, 115 years; Simon Stylites, 112 years; and Romanul, 120 years. Conaro, the famous Italian writer on dietetics, was given up to die at forty, but adopted an abstemious diet and lived to be more than one hundred years old.

The British statesman, Gladstone, enjoyed vigorous health

and did his usual work at 83. The poet, Bryant, did excellent work at 80. Galileo, at 70 years, was an excellent student and a hard worker. Michael Angelo designed the rebuilding of St. Peter's and was on the job in charge of the work at the age of 89. He painted his masterpiece, "The Conversion of St. Paul," at seventy-five, and worked on until his death at ninety. Titian lived to be 100 years of age, and at 87 produced his masterpiece, "The Last Supper." Stradivarius made his most famous violin at 90. Hippocrates lived to be 99 years of age. Sir Isaac Newton worked up to 85. Socrates was 70 at the time he was murdered, while Heroditus lived to be 100 years of age.

LOOKING AT THE FACTS

When we stop to consider the large number of people who are constantly sick in this country, when we pause to consider that over 100,000 Americans annually die of pneumonia; that there are over a quarter of a million people sick in New York City all the time; that many diseases seem to be increasing instead of decreasing; that the health authorities of the country estimate that we have nearly 1,000,000 needless and premature deaths in America each year; when we pause to consider this situation in the presence of the fact that medical science has made great progress in recent years and that we have almost 200,000 doctors and health specialists at work constantly looking out for the welfare of the people; well, whatever our past gains, we have much yet to gain before we have cause for pride in our national health.

In the United States to-day about fifteen persons out of every thousand die annually. Even if we only estimate the value of a human life at $5,000 our annual economic loss from premature deaths alone would be $5,000,000,000. The world's death rate is considerably over 100,000 persons a day.

Judging from the English statistics of illness, we must conclude that at all times in the United States about 3,000,000 persons are seriously ill, of whom about 500,000 are consumptives. Fully half of this illness is preventable.

According to Farr, for every death there is an average sickness of two years, or for each death per year there are two persons sick throughout the year. This would mean in the United States that, as there are about 1,500,000 annual deaths, there will always be about 3,000,000 persons on the

sick list, which is equivalent to about thirteen days per capita. Other authorities estimate the number of sick in this country at a much higher figure—even up to four and one-half million.

Another investigator concludes that: "Out of a population of 110,000,000 only 19,500,000 are in full vigor, with perhaps 37,500,000 in fair health. Almost one-half the population (45,000,000) is thought to be more or less physically imperfect."

Davenport has pointed out the startling fact that of the two million persons who are annually cared for in our hospitals and asylums, half a million are mental defectives and over one hundred and eighty thousand paupers and criminals. By far the great majority owe their defects and their dependency to bad heredity.

One-third of Chicago school children have some nervous disorder, and two-thirds of New York school children are reported physically defective.

ESCAPING DISEASE

We are often asked why doctors do not catch the diseases which they so constantly treat. They do sometimes, but not frequently; and the explanation of the doctor's freedom from the disorders with which he is so frequently brought in contact is the fact that he understands the principles of contagion. He avoids contact, as far as possible, with the immediate source of contagion in his patient, and he also practices scrupulous cleanliness. He further takes care of his health in general, and keeps himself in fit condition to fight disease.

The physician understands both the laws of personal hygiene and the rules of sanitation, and the readers—the families who may chance to have this book—can likewise instruct themselves in the art of preventing disease, so that they can, as individuals and as a family, experience less disease as the years go by, and be better prepared to resist all forms of contagion and infection.

We must remember that Mother Nature endows us with unusual resistance for the first half of the average life, but when we reach middle age and start down the decline, then it becomes more necessary that we learn the laws of health, that we may become more obedient to hygienic requirements—for sooner or later, while Nature may be indulgent for a time, she will foreclose the mortgage and demand that her account

be paid with interest added. The Old Book declares that "Because sentence against an evil work is not executed speedily, therefore the heart of the sons of men is fully set in them to do evil" (Eccl. 8:11); also, "Be not deceived; God is not mocked; for whatsoever a man soweth, that shall he also reap." (Gal. 6:7.)

Our real science of sanitation is only about half a century old, for it was well after the middle of the nineteenth century before the study of disease and its prevention, with the control of epidemics, attracted general attention. It was as the result of the cholera epidemic in England that *William Farr* became a pioneer in the collection of vital statistics, and he has been followed by a group of illustrious successors who have carried the work on to a very high degree of proficiency. Among other men who have contributed to the progress of this branch of medicine are such illustrious names as Jenner, Pasteur, Lister, Metchnikoff, Koch, Gorgas, Reed, Lazear, and a host of others.

CHAPTER II

TRIUMPHS AND FAILURES OF PREVENTIVE MEDICINE

The selective military draft of the World War gave us an opportunity, in a way, to make our first national health inventory. At last, in the disclosures of the rejects of the selective draft, we have a comprehensive, representative, and authentic study that gives us something of an idea of the health status of the American people.

OUR FIRST NATIONAL HEALTH INVENTORY

In carrying out the provisions of the selective draft, the medical examining boards of this country examined about five million men between 21 and 31 years of age. Roughly speaking, they found about one-third of these men to be in such poor physical condition that even the superb physical training régimé of the army camps could not be expected to fit them for any form of active military duty. Of the total number of men examined, over a million were rejected as unfit for service. The Government had to say to these military rejects, in substance: "You are physically inferior; although young, you are diseased, defective, or broken down. You are unfit to go out to defend your country in time of war."

Now if this is the situation with the young men of the country, from 21 to 31, what must be the situation with men who are 35 and 40, and of still more importance is the answer to the question: If the men of America make this poor showing, what would be disclosed if we examined five million women between 21 and 31 years of age? I am of the opinion that the women would not show up even as well as the men, and that somewhere from one-third to one-half would be rejected—if equal standards were applied.

If this same ratio would hold out, taking the population of America to be in the neighborhood of one hundred million—eliminating some of the babies from the reckoning—it would leave us about twenty-five million youths and adults in the United States who are below par physically, who are constitu-

tionally inferior, and who are in need of more or less immediate medical aid.

TRIUMPHS OF MILITARY MEDICINE

In no other department of medicine (unless it be in the recent achievements in lessening the infantile death rate), does the work of modern preventive medicine cover itself with such glory, when it comes to preventing disease and lessening mortality, as is shown in the achievements of the medical departments of the armies of the nations engaged in the recent World War. Outside of the one failure, which stands out so conspicuously—that of the influenza epidemic and its associated pneumonia—the deaths from preventive disease in the army were almost negligible.

In the first place, our old military friends, typhus fever and asiatic cholera, did not even put in an appearance, and from September 1, 1917, to May 2, 1919, with an average muster roll of over two million American soldiers, only five men died from smallpox, only two hundred thirteen from typhoid fever, and the old plague of malaria hardly appeared, only thirteen deaths being recorded.

There occurred, unfortunately, during the time of our military mobilization, a veritable plague of influenza associated with pneumonia, and this with its various complications—pleurisy, empyema, etc.—carried off 41,747 soldiers; emphasizing most emphatically that in the triumphs of military preventive medicine, there are certain phases and features of disease which we have done little or nothing to prevent or control.

The table on page 13, comparing the deaths in the army during the recent World War, and showing what, with the same sized army, the deaths from these various diseases would have been both in the Spanish-American and in the Civil War days, serves graphically to emphasize the great advances of preventive medicine, as regards the health of an army.

THE ACHIEVEMENTS OF SURGERY

The modern surgeon undertakes to do almost anything in the line of anatomical carpentry, cabinet making and plumbing, as concerns the human machine. Joints are operated on without hesitation; they go into the chest cavity and operate upon heart and lungs; they work skillfully upon the delicate structures of the brain—in fact there is only about one triumph left

Disease	Number of deaths that occurred in the World War, Sept. 1, 1917—May 2, 1919. Average approximately 2,121,396 soldiers.	Number of deaths that would have occurred if the Civil War death rate had obtained.	Number of deaths that would have occurred if the Spanish-American War death rate had obtained.
Typhoid fever	213	51,133	68,164
Malaria	13	13,951	11,317
Dysentery	42	63,898	6,382
Smallpox	5	9,536	37
Pneumonia	41,747	38,962	6,086
Scarlet fever	167	112	222
Diphtheria	100	1,183	149
Tuberculosis	1,220	9,574	631
Meningitis	2,137	3,859	4,081
Other diseases	3,768	34,881	15,587
Total of Diseases	49,412	227,094	112,656

for surgery, and that is the transplanting of vital organs; that is—the ability to take a kidney, for instance, out of some unfortunate individual who has been killed by an accident, and put it into the body of a man who has been living too swiftly—who has Bright's disease. While this has been done only in exceptional cases in human beings (a few cases in which the sex glands have been temporarily transplanted) it has been done more or less successfully in the case of lower animals. Cat's kidneys and sheep's kidneys have been put into cold storage and later put into the body of a dog, and the dog has lived.

This probability of transplanting vital organs suggests a strange possible situation in future times, in which the well-to-do citizen with a crippled kidney may seek to take out a mortgage on the kidney of some less prosperous fellow, in case he of the good kidney should suddenly shuffle off from some accident, whereupon he of the bad kidney would hie himself to a hospital—to go to sleep for an hour—and come out with a pair of kidneys almost as good as new.

We tell such stories as these in a jocular spirit at the present time, but they are not altogether beyond the pale of possibility in the not far distant future.

MASTERING THE MICROBE

The natural, normal man is mightier than the microbe. The healthy man is not attractive to the ordinary, average disease germ—except in the case of a widespread epidemic, such as

smallpox, influenza, pneumonia, etc.; and so, while we are on the way to a realization of the fulfillment of Pasteur's prophecy that it is "within the power of man to drive all microbic diseases from the face of the earth"; while we are succeeding in our struggle with the microbe in this gigantic war which is being waged between the trained forces of science on the one hand and the malignant forces of disease on the other; nevertheless, we are pitifully losing out in our efforts to overcome many of the non-microbic maladies.

Disease microbes usually attack men when they are already sick, when they are run down and weakened from some cause or other, for the very same reason that moss grows only on the shady side of an old dead or dying tree. In other words, as a general proposition, you have got to get sick constitutionally before you take sick with "bugs"—except as in the case of the epidemics previously mentioned.

Typhoid fever has about departed. I get vaccinated every few years, and I don't fear the disease, even if somebody else is unclean and insanitary. Vaccination will protect against all but the most gross infection, but this fact should not cause us to slacken our efforts to improve all water and milk supply, as regards typhoid and other infections.

Our soldiers in the World War did not die like flies, as they did in the South during the Spanish-American War, from typhoid fever. We have made such improvement in the work of preventing typhoid fever, that according to the latest American statistics, the typhoid rate throughout the United States is about ten per hundred thousand. This would suggest that about one-twentieth of our population may expect to have typhoid fever at some time during life. While this is a great improvement over conditions as they were twenty-five or thirty years ago, it is not at all satisfactory, as Great Britain has a typhoid death rate of only 3.5 per hundred thousand, less than half of our rate.

We not only ought to reach a typhoid mortality rate as good as that of England, but we should not stop until we can equal that of Chicago, which is practically only one death per hundred thousand of population. In fact, typhoid has become so rare in Chicago that the moment a physician suspects it, he immediately asks the patient what part of the country, outside of Chicago, he came from. In Chicago, we regard typhoid fever as a "country" disease.

The "old oaken bucket, the moss covered bucket that hung in the well," nowadays as in years gone by, too often brings up the deadly bacilli of typhoid, to be quaffed by the innocent and thirsty patrons of the well in which it hangs.

The farmer must learn three things about typhoid fever, in order to lessen the country death rate. First, the danger of the open privy vault; second, the ease of infecting the open dug well; and third, the rôle of flies as typhoid carriers infecting milk and other food stuffs.

The beneficial results of modern sanitation have been more largely enjoyed by the larger centers of population. The big cities have experienced a lowering of the disease and death rates to a greater extent than has been enjoyed by the rural communities; but it is to be hoped that the country districts of the United States will soon catch up with their city cousins in the good work of sanitation and other disease-prevention procedures.

Yellow fever, malaria, bubonic plague, Asiatic cholera, typhus fever, typhoid and smallpox—not to mention diphtheria—have been either partially or almost wholly vanquished. Science has all but achieved the victory over the microbe—only a few diseases (respiratory and venereal) remain to be conquered.

THE NON-MICROBIC MALADIES

One of the present mistakes of Preventive Medicine is that it has given its attention almost exclusively to the prevention and control of the so-called contagious diseases. But, in the future, more attention must be given to the prevention of so-called "habit disorders"—the diseases which are apparently so greatly on the increase at the present time.

These more or less chronic diseases sometimes have their beginnings in very slight departures from normal health, sometimes in but trifling and minor infections such as common colds, but these oft-repeated assaults upon the vital resistance of the body result in the accumulation of effects, from time to time and from year to year, until by and by the bodily resistance becomes so depleted—the system so weakened—that the constitution succumbs; and it is to the combating of these diseases which have been so largely neglected in the past that medical science must turn its attention in the near future.

There is too great a tendency, on the part of the average person, to disregard the early warnings of disease. You must be taught how better to read the admonitory handwriting on the wall, and thus to detect the first appearance of the symptoms of serious disease. In this way we will be able, in the next fifty years, to do as much toward lessening kidney, liver and heart disorders, as we have in the past fifty years to lessen smallpox, cholera, yellow fever, typhoid, etc.

THE FAILURES OF PREVENTIVE MEDICINE

While it is both encouraging and refreshing to record and recount the development of modern sanitary science and the achievements of our more recent efforts along the lines of preventive medicine; nevertheless, it is more fitting just now, and will be more productive of increased efforts looking toward health improvement and race betterment, if we will frankly and honestly sit down together and face the facts—sincerely recognize wherein we are failing to stem the tide of disease and death.

Many of the diseases and conditions about to be mentioned will be more fully dealt with in subsequent chapters—in this chapter they will merely be summarized. We have already frankly admitted that among the germ diseases, we have fallen down almost completely in our efforts to understand and control both influenza and pneumonia, while at the same time we are making an almost complete failure of our methods of controlling venereal disorders, although we are fully cognizant of their causes and know how to prevent, suppress and control them.

Men of science and medicine have not only failed to improve the situation and lessen the death rate from the so-called "habit disorders" or "old-age diseases," but these diseases are rather heavily on the increase—in the very presence of our splendid achievements in other domains of preventive medicine. As will be shown in detail in chapters to follow, kidney diseases, heart disorders, diseases of the blood vessels (arteriosclerosis) with their consequent afflictions of apoplexy and paralysis have increased to an alarming degree during the last generation.

These commonly called "degenerative disorders" are all quite fully understood, as regards their causation, but since not any of them are directly germ-caused diseases, the great

advances of sanitary science have not in any way touched upon, or led in the least to improvement, as regards their prevalence and the enormous premature death rate resulting therefrom. This constitutes the great failure of modern preventive medicine—the fact that it has overemphasized sanitary science and failed to promote the cause of personal hygiene in a corresponding degree.

While we are, apparently, increasing the average length of life, and have almost accomplished the overthrow of the "filth diseases," we are permitting the civilized nations to go right along committing suicide on the instalment plan through our failure to check the increase of these numerous "degenerative diseases"—the habit-caused disorders.

THE HEALTH STRUGGLE OF THE FUTURE

The future health propaganda, while perhaps not dealing any less with sanitary science and public health measures than in the past, must pay more attention to *personal hygiene*. It must also take up such problems as the cause and cure of cancer. Cancer is a standing menace which challenges the entire medical profession and the scientific world, to discover its cause and develop methods of combat and cure.

Even such a commonplace problem as acute and chronic colds remains to be solved. We have made astonishingly slow progress in the development of methods to prevent or alleviate this ordinary, every day, harassment.

The proper place to begin this new health propaganda of hygiene is in the public schools; not only in instructing the children, but in a brand-new teaching of physiology and hygiene which shall begin in the early grades and follow the pupil throughout his educational career—to the finish of high school—and then into college. In this way the children can be taught the importance of both periodic dental and medical examinations, and will be able to carry this hygienic teaching home, with a view of also affording some little help to the passing generation. *Personal hygiene is the keynote to the health teaching of the coming generation, and all our past achievements will not serve to stay the tide of increasing disease or to bring about an improvement in the death rate from these "habit disorders," until we, as a nation, have passed through the experience and enjoy the benefits of a real hygienic revival.*

TOKENS OF THE DAWN

Having, in this chapter, briefly portrayed the triumphs of modern medical and sanitary science, and having also frankly pointed out some of our humiliating failures to improve human health and lessen the death rate from certain groups of physical disorders, it may not be amiss briefly to survey some of the encouraging omens, to point out the tokens of the dawning of a new era—of a better day—which promises to correct the mistakes of the past and to fulfill, at least to some degree, our high hopes of the future.

The indications of the awakening of the health consciousness of the American people are shown by the recent organization of numerous societies devoted to the study of various health problems and numerous diseases, such as the societies for the study and prevention of cancer, tuberculosis, venereal diseases, feeble-mindedness, etc. Still further evidence of this awakening along health lines is presented by our many activities directed toward enlightening the public regarding health and hygiene, among which may be mentioned the following:

1. *Public health administration.* Increased efficiency in public health administration, including the agitation for better registration of births and deaths. The increasing efficiency of the health departments of towns, cities and states.

2. *Health literature.* Newspapers and magazines, not to mention the great number of books for the layman, good books too, which have appeared and are now appearing. Almost every paper of any consequence in this country has a regular health department, as a rule, supervised by a competent medical authority.

3. *Industrial medical supervision.* Factories, manufacturing establishments, not only the large ones, but even some of the smaller ones, now have their institutional physicians and a more or less well regulated system of supervising the health and efficiency of their employees.

4. *Insurance supervision.* A few insurance companies are trying to provide annual supervision for their policy holders. I sometimes think that the health movement—like the temperance cause—will achieve no great success until it gets on more or less of a commercial basis. The insurance companies can save money by keeping their policy holders

alive, and so they are therefore doing a great deal to foster and father this new movement of preventive medicine.

5. *Infant welfare.* One of the great causes of lessened mortality, and of apparent increase in the average length of life, as has already been noted, is the great improvement in infant care—in the prevention of the diseases of the earlier years of the child's life. Pure milk stations, mothers' clinics, the infant welfare movement, the whole nation-wide propaganda for saving the babies, has produced definite results.

6. *School inspection.* The improvement and extension of our medical inspection of schools, with the general improvement of school hygiene, whether in the matter of exercise, athletics and free lunches, have all contributed something to maintaining the resistance of our youth against disease. The school nurses are the latest development along this line.

7. *Simple living.* There is a growing popularity of what might be called the simple life or the "back to nature" movement. The vast majority of intelligent people of the younger generation ventilate their bedrooms. The old-fashioned dark, damp, clammy spare bedroom is passing out of existence. Personal hygiene among all classes has improved one hundred per cent in the past twenty years.

8. *Improved hygienic teaching.* The educational institutions of the land, colleges and high schools, are giving more attention to hygiene. The mania for out-door living has been augmented by the automobile. Out-door athletics are still popular, and physical culture has become almost a fad to some enthusiasts. Associated with this revival in out-door living, are to be found those who advocate the movement of "back to the land," and who are advocating the suburban method of living for some of our city dwellers.

9. *Moral advancement.* The sex educational propaganda, together with the movement which has declared war on venereal diseases, is a hopeful sign for the earlier years of the twentieth century. The anti-race-suicide propaganda, and the mutterings against the professional abortionist, all point to a further awakening of our health and eugenic consciousness, which promises good for the near future.

10. *Improved dietetic habits.* The pure food legislation, together with a more general dissemination of dietetic knowledge, has been a great help in the last few years. The United States Food Administration, during the war, did a tremen-

dous amount of good by its dissemination of a better understanding of food stuffs and dietetics in general. The average American of this generation knows more about foods than did his parents and grandparents.

11. *Supervision by the family physician.* A great many people are forming the habit of going to their doctors once or twice a year just like they go to their dentists, to be looked over; and although in many cases this work may not be as thorough as might be desired, yet it is of great value—even as in the case of those laboratories which are examining the urine several times a year.

12. *The modern eugenic movement.* Last but not least, the nation is waking up to appreciate the importance of heredity as a factor in human health and efficiency. The growth of eugenic knowledge and sentiment throughout the country is an encouraging indication. Race hygiene is coming more and more to be recognized as one of the vital themes for present day discussion and study.

CHAPTER III

DISEASE AND ITS CAUSES

Before we enter more fully upon the discussion of disease-prevention, it may be well briefly to consider the more common causes of disease, as well as to give a little attention to just what is meant by the term "disease," as it is used in modern medicine.

For ages the study of disease was retarded by ignorance and superstitution, but with the great increase of knowledge in more recent times, especially since the discovery of the microscope, a tremendous amount of light has been shed upon this once dark and mysterious subject.

ANCIENT BELIEFS REGARDING DISEASE

Primitive peoples, in ancient times, believed that disease was the result of evil spirits which came to possess human beings and inflicted upon them all the different sorts of suffering which are associated with various maladies. It is barely possible that the ancient physicians came to this conclusion through observing the change in temperament and disposition which accompanied various forms of acute and chronic disease. The man who is normally happy, cheerful and jolly, is turned by disease into a morose, irritable and altogether disagreeable individual, and as the disease progresses he becomes more markedly changed, and sooner or later manifests the additional symptoms of pallor and emaciation.

The idea of demoniacal possession also may have grown out of the various contortions which accompany some diseases, as well as the convulsions associated with other disorders. It must be remembered that in olden times almost every phenomenon of nature was attributed to the distemper of the gods. The supernatural was recognized in the most commonplace occurrences; and so it is not to be wondered at that these primitive races came to look upon disease as a punishment inflicted by the gods—as a torture expressive of the Deities' anger and wrath.

And, of course, their mode of treating disease was entirely consistent with their belief in its nature and origin. If it was the indwelling demon that caused the trouble, the proper remedy was to dislodge the evil spirit, and it was for such remedial purposes that many of the rites and ceremonies of primitive religions came into existence. And so it was only natural that the ancient priest should become at the same time a physician to his afflicted people. Disease was but a matter of dealing with demons, and the priest being versed in the superstitious theology of the day naturally became the person, in the eyes of these primitive peoples, best qualified to drive the satanic lodger out of the afflicted body, and thus to restore health to the sick and suffering.

Ancient quacks. Thus the professions of medicine and theology became united in the person of these primitive "quacks"—at least that is what we would call them at the present time. All sorts of grotesque, sometimes painful and harmful methods, were employed by these physician-priests in their efforts to drive out the demon.

Certain waters had a reputation for antagonizing evil spirits, as did also the air from certain caves, and so these foolish and silly methods of regarding and treating disease prevailed down to the time of Hippocrates, the Greek physician, who lived several centuries before Christ. He was among the first of the ancient teachers and philosophers who recognized the treatment of disease as a coming science—as a distinct profession—and he did much to combat the superstitious beliefs of his day.

HIPPOCRATES—THE FATHER OF MEDICINE

Undoubtedly to Hippocrates belongs the honor of first calling attention to the fact that food, climate and personal habits of living, have something to do with disease, and of directing attention away from the then-prevailing and exclusive belief in satanical possession as a cause of human affliction. Of course, Hippocrates also was wrong in his ideas as to the nature of disease, for he believed that disease was caused by certain "humors" in the body—a belief, by the way, that has not been entirely purged from the minds of many persons of the present day and generation; although Hippocrates rather believed that it was excess of these humors that caused the disease, and that health resulted when they were in proper

balance. He was right in so far as he believed that disease was a result of bodily disarrangement.

Hippocrates did not succeed to any large extent in overcoming the superstitions of his day. In fact, only in recent years have we given up the belief that disease is due to the possession of evil spirits, that the well man is blessed of the gods, that the sick one—having offended the higher powers—is suffering in consequence of Divine wrath.

Not long ago I met a splendid old soul, a lady of some sixty-odd years, who, in describing her affliction, said that she "had been under the power of the enemy for more than fifteen years." What a situation, to have this good woman believe that she had incurred the disfavor of God, and, as a result, had been paralyzed and confined to a wheel chair for over fifteen years.

People still speak of fighting disease as though it were an entity, of catching disorders as though they were being invaded by another personality, and of driving out disease and inflammation as though it were a power or force that had purposely invaded the bodily domain.

MODERN VIEWS OF SICKNESS

The discovery of the microscope brought about an entirely new view of disease. It taught us that the body was composed of little cells, and that it was disorder or derangement in these cells that produced the phenomenon of disease, with all its symptoms and sufferings. In the human body these living cells are separated into groups forming organs and the various systems of the body, with their functions, and it is the disturbance of these cells that produces the symptoms that we commonly recognize as disease.

"When all of these cells are acting harmoniously, each performing properly the work belonging to it, the whole body is in a state of health." It is not only the task of the living cells of the body to serve us in this way, but they are also required to keep themselves in good health and perfect repair. Every thought of the brain, every transmission of an impression by a nerve, every contraction of a muscle, occasions the injury or destruction of thousands of these tiny cells, and if these microscopic little creatures were not promptly replaced by succeeding generations, death of the individual would speedily result.

Anything which interferes with the structure or function of these cells or tissues of the body will cause disease, and so *disease may be defined as being the result of anything which deranges the bodily functions or structures.*

Health is nature working in the body under conditions of obedience—normal conditions. Disease is the same force of nature working in the same body under conditions of disobedience—abnormal conditions.

Physiological action is associated with health; the behavior of the body in disease is spoken of as *pathological;* and it should be borne in mind that there may be all degrees of departure from the normal toward the abnormal, thus resulting in varying degrees of disease, in accordance with the degree of deviation from the normal mode of cell function.

Where the bodily structures are deranged, we commonly speak of the condition as *organic disease;* and where there is merely a disturbance of function, without definite change in the structure, we commonly designate the ailment as *functional disease.*

Disease is really beneficient in its natural purposes. The vital reactions which are present in disease are practically identical with those processes which characterize the body in a state of health. The abnormalities and disturbances of the vital functions which are manifested in disease are due to the efforts of the body to adapt itself to the abnormal conditions presented by the disease; and, further, the picture of disease represents an effort on the part of the body to correct or remove the disease invasion and at the same time repair, if possible, the damage caused by the disorder.

CONTAGIOUS DISEASES

The so-called contagious or transmissible diseases, such as diphtheria, measles, mumps, scarlet fever, smallpox, chickenpox and whooping cough, are said to be epidemic when one person in a thousand in a community is stricken. When a disease like influenza extends over several continents at the same time, it is said to be pandemic. When an epidemic strikes a community, it finds some persons who are immune and others who are susceptible to the disease.

Immunity to a disease may be acquired by having experienced a previous attack, or having had a similar disease, like in the case of vaccination producing cowpox, and thus pro-

tecting the vaccinated individual against smallpox. Or the disease may be fought by means of antitoxin, as in the case of diphtheria. Still another method of preventing and fighting disease is by means of the germ toxins, which are administered in small, but increasing, doses. This method has been tried with great success in the prevention of typhoid fever and with some success in the treatment of tuberculosis.

It is certainly a mistake to expose small children to any of the contagious diseases of childhood, with the view of having them "take the disease and be through with it when they are young." Whooping cough may predispose to pneumonia and tuberculosis; scarlet fever may affect both the heart and the kidneys; measles may lead to serious disease of the eyes, as well as tuberculosis; while diphtheria commonly affects the heart and kidneys, and may leave the nervous system so crippled as to result in paralysis. Many of these diseases are very fatal to the infant. By means of quarantine, isolation, disinfection and every other rule and regulation of the modern Boards of Health, these diseases should be fought and resisted. The directions of the health officer and the attending physician should be strictly, yes, conscientiously, carried out in all these matters.

Modern medical research concerning the cause of disease has resulted in the production of such a vast array of scientific evidence respecting the specific character of various diseases, as almost to destroy the old superstition which taught that human affliction resulted from the distemper of the gods, the juxtaposition of the stars, the phases of the moon, or some "mysterious dispensation of Providence."

Microbes and disease. While the older and unscientific ideas regarding the "catching of disease" have been largely dispelled by the scientific searchlights of the twentieth century, the newer teachings of science regarding contagion and infection are not yet fully grasped or thoroughly understood by the average individual of to-day.

The layman has, in a general way, come to understand that the various communicable diseases are transmitted from one person to another by means of "germs" or "parasites." But the particular channels or specific means whereby the germs of disease are conveyed from one person to another, and from one locality to another, are not as fully understood as they should be, to enable the layman to coöperate intelligently with

the health authorities in the gigantic struggle which is now being waged in the arena of hygiene by the trained forces of science against the malignant forces of disease. This great "health battle" which is now on, has for its object the *prevention of disease,* the promotion of health, and the preservation of the race.

THE SOIL OF DISEASE

There are certain general conditions which favor the spread of contagious diseases. These should be first disposed of before we later take up the consideration of "disease carriers" for specific maladies. Environment, sanitation and climate, together with the actual physical and mental state of the individual, all act as predisposing influences in the "catching of disease." The soil of many diseases consists of a combination of lowered vital resistance and bad sanitation.

1. *Lowered vital resistance.* In a general way, the human body resists disease by means of certain inherent and automatic agencies of self-defense, which are resident within the body. The sum total of these "fighting powers" or resisting measures of the body, is spoken of as the individual's "vital resistance."

We desire to emphasize the fact that it requires a "disease-soil" as well as a "disease-seed" to produce the various contagious and infectious maladies; that is, the germs of disease may fall upon one indivdual who, because of his strong "vital resistance," presents an unfavorable soil for the growth and development of these germs; therefore, he does not take the disease. Some of the same group of germs gain access to another individual, who, because of his low "vital resistance," presents a favorable soil for the growth and development of the germs of this particular disease, therefore, this individual is immediately stricken down. And so, we repeat, a favorable soil is required for the development of transmissible diseases as well as the presence of the seed or germ of the disease itself.

Ordinarily, health is more contagious than disease, and microbes are not attracted to the perfectly healthy individual. The normal healthy man is usually mightier than the microbe.

By the cultivation of "vital resistance" and the proper regard for sanitary regulations on the part of the whole human race, it is entirely within our power eventually to drive every germ disease from the face of the earth. While it is advan-

tageous to understand fully the working of various "disease carriers," it is equally important to cultivate a physical constitution which is able to withstand all ordinary "germ attacks."

2. *Insanitary surroundings.* Under this head are included faulty disposal of sewage, dark basements and damp cellars, accumulated rubbish in the back yard, bad plumbing, drains, together with contaminated vaults and cesspits, barnyard filth, etc. These same unhygienic surroundings indirectly react to the weakening of the individual's "vital resistance." But, after all, these are rather the "disease breeders" which work together with "disease carriers" for the spread of disease.

In the battle against contagious diseases, it is absolutely essential that the health authorities should have the unqualified support and conscientious coöperation of every person in the community. The carelessness or indifference of a single individual, or the disregard of the health officer's instruction by a single family, often results in giving a fresh start to a smoldering epidemic, producing untold suffering and much loss of life.

3. *Ignorance and indifference.* It should be remembered that sunshine, fresh air, and cleanliness, are the effective weapons to use against disease germs. In spite of all these, the germs of certain epidemic and contagious diseases are sure to fasten themselves upon a goodly percentage of individuals who may be exposed to them.

The moment that you suspect yourself or a member of your family about to be afflicted with a contagious disease, summon your physician. Even a mild contagious disease may have serious complications, and it is certainly unwise for parents to undertake to carry their children through these attacks. To do so may be to jeopardize the future health and welfare of the child. It is important that the physician's orders at such times be adhered to. The doctor has a reason for asking you to be careful to prevent certain complications in these common diseases of childhood.

CHAPTER IV

THE MISSION OF PAIN

The mission of pain is that of a friendly sentinel—physical suffering is designed primarily to play the rôle of a warning messenger; and, subsequently, to serve as a corrective influence. Suffering must never be regarded as an arbitrary punishment—as a manifestation of the wrath of the gods. Pain is an outcry of the physical conscience against disease-causes and bodily abuses—designed to protect us from imminent danger of impending doom.

A noted infidel once said that if he had been making this world he would have made health catching instead of disease, and that he would have created pleasure instead of pain. But that is exactly what Nature did—health is far more contagious than disease—wherefore, the human race has survived all of the disease scourges of past ages; while pleasure is the natural, normal sensation resulting from life, and pain only results when the nerves are unnaturally and abnormally stimulated, or the organism is in some manner disordered and diseased.

Pain is nothing more or less than the perversion of pleasure. Painful sensations are the harvest—the result of the neglect and abuse of the natural sources of pleasure—the nervous mechanism of the physical body.

THE LANGUAGE OF SUFFERING

Pain and suffering come upon us as a natural consequence of irritating the brain and poisoning the nerves. Pain is simply a physiological warning—a psychological monitor, designed by nature to lead us away from the paths of disease and danger. The voice of pain should never be lightly regarded. The language of suffering, when properly interpreted, tells of wrong habits, unwholesome practices, insanitary surroundings, and yields an eloquent warning designed to reform the sufferer—to cause him to make speedy amends—in fact, the real mission of all pain and suffering is to lead the biologic

sinner to that place where he will "cease to do evil and learn to do well."

Warnings of pain are designed by nature to prevent suffering, and, suffering, after it has come upon us, is usually nothing more or less than our own transgressions transposed into nature's penalty.

The voice of pain is reformatory in its purpose and the language of disease is corrective in its mission. It is a common practice, when pain has raised its voice in eloquent protest—warning us of the dangers besetting our course, for us to reward this beneficence of nature by resorting to the use of some powerful "pain killer" or to some popular patent poison which quickly serves to silence these friendly voices of pain, while they in no wise work to remove the cause, and thereby bring about a rational and permanent cure.

While it is true that pain must be relieved when it is of great severity or long continued, while it is true that life itself is sometimes dependent upon our ability to stop suffering; nevertheless, before resorting to the use of these powerful pain remedies, which are usually composed of deceptive and dangerous habit-forming drugs, it certainly would be the better part of wisdom to give a thorough trial to such effective measures as heat, light, rest, and other natural agencies, which are often so highly successful in the relief of even the most severe forms of pain.

THE PURPOSE OF AFFLICTION

It may safely be said that the wise purpose of suffering and affliction is to produce repentence and reform; and yet we are often called upon to endure severe and long continued physical affliction under such conditions as render it exceedingly difficult to discover the exact transgression which is directly responsible for our misery. Our inability, thus always directly to discern the sin which is immediately responsible for the suffering, is, no doubt, in some measure at least, due to that lenient practice—that merciful habit of Nature—manifested in holding back, as it were for a time, the just penalty of nearly all our sins against her. I refer to the interval which always occurs between seedtime and harvest.

In this way, Mother Nature gives the physical sinner an opportunity to repent of his wrong practices a long time before the full harvest of his transgression breaks upon his defence-

less head; but when her patient forbearance fails to bring about repentence leading to reform, there is but one thing more for Nature to do, and that is to withdraw her sustaining arm of vital resistance and allow the physical sinner to reap the full harvest of suffering which springs up from the seeds of his own wrong-doing.

And there can be but little doubt that Nature has wisely arranged that our suffering shall ordinarily constitute her last corrective appeal designed to turn our feet from the path of disease into the highway of health—to save the physical sinner from the ultimate destruction attendant on his continuance of sin. Indeed, this teaching regarding the purpose of affliction is a very ancient one for it was, we believe, the prophet Jeremiah who wrote: "Thine own wickedness shall correct thee."

SOWING AND REAPING

Within every physical transgression, within every violation of the laws of life—within every compromise of the laws of health—there is concealed the seed of bodily disease and physical suffering; but time is required that the seeds of sin should bring forth their harvest, first of pain, then of suffering and disease, and, in the end—if the corrective mission of these should fail—destruction and death.

In every act of life the reaping is really contained in the sowing, and while there is invariably a delay between the seedtime and the harvest, it is, nevertheless, unerringly true that "Whatsoever a man soweth, that shall he also reap." But combined mercy and wisdom is shown in the fact that nature first flashes to the individual her warning signal of pain, and, after that, even when the full harvest-penalty of our sin descends upon us as the result of our persistent transgression—even then, all this resultant suffering is largely corrective and curative in its effect upon the body—in the earlier stages, at least, acute diseases are usually corrective and curative.

The warning rôle of pain and the corrective mission of suffering may well be illustrated by a common experience which most of us have passed through at one time or another in our lives—we refer to the common accident of putting one's hand on a hot stove. The pain immediately felt causes one quickly to remove the hand and who can but recognize, in view of its threatened destruction, that this intense and immediate pain is the kindest possible feeling which Nature could

dispatch to, or arouse in, the consciousness. Under such circumstances, pain can only be looked upon as a warning voice. calling upon you to take immediate action to save the threatened member. In fact, were it not for the restraining influence of physical pain, untold thousands of selfish and heedless mortals would quickly plunge themselves into all manner of sinful indulgences—soul and body destroying practices—which would speedily terminate their individual existence, and, ultimately, threaten even the integrity of the whole human race.

Even *the blister* which was raised upon the burned hand is more or less of a corrective and curative process. The blister is Nature's first effort to correct the results of the burn, and, as far as possible, to encourage the healing of the wound by the formation of new skin underneath. These reparative processes are protected by the blister overhead with its neutral water bath underneath; indeed, this is an ideal process, provided the water that is contained in the blister does not become infected by microbes and thus lead to the formation of pus. In this latter event, it would be better if the blister had been pricked and suitable artificial dressing applied.

CAUSE AND EFFECT

Every actual physical pain is the effect, directly or indirectly, of some physical cause. The mission of pain and the language of disease represent a chapter in human experience but little studied, but little understood, and, as a general rule, grossly misinterpreted. Too often the sufferer is wholly unable to read the handwriting of disease and distress on the walls of his own living temple. The average sufferer stands in great need of a physiological Daniel to interpret this handwriting of disease on the walls of the body. The civilized races are exceedingly slow in coming to recognize that, in a general way, all matters of health and disease are controlled by the inexorable laws of cause and effect—sowing and reaping.

The time has come when intelligent men and women should understand how quickly to translate the voice of pain into terms of trangression, how intelligently to interpret the language of disease into acts of reform. How long before the world will come to understand the true relation between sin and suffering, to understand that suffering is an effect and sin the cause? How long before we shall finally and forever

be delivered from that ancient and superstitious nonsense so commonly expressed in the modern funeral sermon which lays the blame for disease and death upon an allwise God by affirming that the loved one was removed from our midst by a "mysterious and inscrutable dispensation of Providence."

Indeed, it would seem that men and women with ability to discern *the handwriting of disease* and interpret the language of suffering have always been scarce upon the earth, for even in the times of Job, the afflicted, it was said of the one who would be able to show him the significance of his suffering and the mission of his misery—it was said of such a messenger or interpreter, that he was "one among a thousand." True, Job had many so-called comforters, but none was able to help him in deciphering the meaning of his troubles, to learn the way out of his sorrows, so much so, that it was said of the one that was able "to show unto men what is right for him"—that he was "one among a thousand."

ACUTE AND CHRONIC DISEASES

We have alluded to the experience of suffering and the processes of disease as being both corrective and curative, and while this is largely and strictly true of acute disease, it is not altogether true of chronic disease. It is only while disease is in its earlier or acute stage that it is ordinarily curative. In these earlier stages, in general, acute disease may be looked upon as an effort of Nature to cure, and what we commonly regard as *disease* is simply the *reaction phenomenon* which results from Nature's wonderful efforts to restore the body to a normal and natural state; but if the habits of living are not corrected, if the exciting and irritating causes of acute disease are not abated, if the acting causes of the warning pain are not removed—then, in the later or chronic stages, the disease usually becomes a process of degeneration and destruction in its effect upon the body, and, ultimately, it assumes the rôle of a chronic, organic disease.

And so, while in the acute stage of the disease, nature is ordinarily able to cure the ailment more or less completely by her unaided efforts, when the exciting cause is removed; it is altogether different in the realm of chronic disease, for here, even after the original causes have apparently all been removed, health is usually regained only by a process of persistent culti-

vation, or it may be discovered that the disease has taken on the form of an obstinate, chronic and incurable malady.

PAIN A DANGER SIGNAL

Of all the sensations which we experience, pain is indeed our best friend, for it comes to be our very best teacher. We must get away from the old idea that pain is a thing always to be despised and lightly regarded; we must overcome the notion that pain is an arbitrary interference with the normal and natural pleasures of living. Pain is just as necessary to life as corrective discipline is to the success of an educational institution.

In fact, when we come to understand all the relationships of the case, we are compelled to look upon suffering as a friend and not an enemy; that is, the mature results of suffering to the human race—if suffering were properly interpreted and pain rationally understood—would be positively for good and not for evil; and that such is the case is well shown by the common experience of the surgeon, who, while he recognizes suffering and constant pain in the abdomen as indicative of grave danger, also recognizes as far more grave and dangerous the sudden disappearance of that pain, which suggests to his mind an internal catastrophe—probably the rupture of some diseased organ and the consequent spreading of infection throughout the abdomen—with its probable fatal termination.

Pain is indeed a danger signal—an automatic and ever-acting system of alarm wires which are everywhere stretched out over the vast domain of the physical body—always ready to catch the least suspicion of danger and disease and flash the warning in no uncertain terms to the brain, the citadel of intelligence and action, from whence, if the warning messages of pain are properly deciphered and comprehended, the orders may be dispatched to withdraw the body from the zone of danger or to reform the unwholesome practices which threaten disease or disaster.

And so, while pain is at first a warning signal of danger, it may later become, if unheeded, a disease indicator, a symptom of the very thing which it was originally designed to prevent. And we should also remember that false sensations of pain may be experienced which are purely imaginary and wholly fictitious.

CHAPTER V

HEADACHES—THEIR CAUSES AND PREVENTION

Headaches are almost a universal affliction in the human species. They are the most common of all minor ailments, and sometimes they attain that severity and frequency that makes them a major complaint. Headache is the one form of suffering which makes all the world feel akin because of its well-nigh universal occurrence.

How many times every week these sufferers appear in the doctor's consulting office and confront him with this time-worn and wailful complaint: "Doctor, I am certainly going crazy if I can't get rid of these terrible headaches. Isn't there any way to find out what causes these distressing pains in my head? Is there nothing that can be done to relieve me?"

Headaches must be very common, because from reliable vital statistics we learn that about 15 per cent of all school children suffer more or less constantly from headache; while 25 per cent of men, and over 50 per cent of women suffer more or less regularly from chronic headache.

WHAT IS A HEADACHE?

Just what is a headache? Why does trouble in various parts of the body manifest itself by pain in the head? One thing is sure—not one time in one hundred headaches is the real trouble in the head. When your head aches it is usually simply doing a combination of scapegoat and fire alarm duty for some other part of the body.

As the brain is the servant of the body rather than its master, someone has suggested that the devoted head meekly offers itself as a sort of vicarious atonement for the sins of the entire body. It is the eloquent spokesman for such "mute, inglorious Miltons" as the stomach, the liver, the heart, the kidneys and muscles. "The humblest and least distinguished of all the organs of the body can order the lordly head to ache for it, and the head has no alternative but to obey."

The causes of headache are legion, and while we cannot

consider all of the many influences and agencies which may be able under various conditions to produce pain in the head, we will, nevertheless, attempt to classify and study the more common causes of the more frequent types of headache.

It really seems that the problem of avoiding headaches is the problem of the whole conduct of one's life. When one is intelligent regarding the causes of headaches one can go about the task of preventing them with some hope of success. The secret of preventing any disease is first to find the cause. If you can avoid the cause—you can prevent the disease.

Cabot, in the order of their frequency, classifies causes of headaches under the following fifteen heads:

1. Fatigue, bad air and hunger.
2. Constipation and indigestion (biliousness).
3. Alcohol (the "day after" headache).
4. Eye strain and diseases of the eye.
5. Infectious diseases.
6. Menstruation.
7. Functional nervous disorders.
8. Kidney troubles.
9. Meningitis.
10. Sinusitis—sinus infections.
11. Facial neuralgia.
12. Indurative headache—neuralgia.
13. Migraine.
14. Brain tumor.
15. Syphilitic conditions.

THE SIGNIFICANCE OF HEADACHES

Our patients always want us to explain why they should suffer so constantly and severely from headaches, and the answer is different in almost every case. We must learn that headache is not a disease, it is merely a *symptom*. With the exception of certain diseases of the brain and nerves, pain in the head is merely a symptom of disease or disorder in some internal organ, the organs of special sense, or else it indicates some sort of functional disturbance of the circulatory or nervous systems.

Headache is usually a danger signal. Pain in the head is the red lantern of warning, swung out across the highway of health, warning the physical spendthrift that danger is ahead.

When your head aches, you should never fail to look for

the real cause. You should not rest satisfied with merely finding relief from the pain. Do not stop until the underlying causes of your head pains are discovered and, if possible, removed.

Frequently we doctors are asked questions like this: "Why is it I have these splitting headaches, and my sister, who lives just like I do, is never bothered?" "Why should stomach trouble give me a headache when it doesn't give other people headaches?"

In order to answer such questions as these it will be necessary to explain that all persons suffering from chronic headaches, possess both headache *soil* and headache *seeds.* What is meant by headache soil and headache seeds?—We will make it plain:

1. *Headache soil.* Nearly all sufferers from chronic headaches have what we doctors call a *nervous tendency.* That is, they have more or less of a disturbance of the balance of the general nervous system. It often develops that their grandmothers had neuralgia in the head: their mothers had sick headaches, etc. In the person's family history there crops out at some point evidence of this nervous tendency or disturbance which we have learned to look upon as the headache soil.

2. *Headache seeds.* Now, it often happens that you could go through life with this headache soil or headache tendency of the nervous system and never suffer from pain in the head, unless there occurred some local irritation or special aggravating influence (headache seed) to start up the pain in the head.

Or the other hand, one might carry around a number of these *local causes* of headache throughout life, and not suffer from headaches, provided they had a strongly balanced nervous system and an equalized circulation of blood.

When the nervous tendency is great, it requires but a trivial local irritation to produce pain in the head; on the other hand, when the local irritating cause is very intense, headaches may result even when the general nervous health is but little impaired. If there is a marked nervous tendency and the local irritation is very great and the blood is filled with poisons, we have all the conditions present to produce severe and persistent headaches.

CLASSIFICATION OF HEADACHES

For purposes of study and prevention we think it best in this work to put headaches into seven different groups. As will

be observed, headaches arising from almost half a hundred different causes may conveniently be classified under these heads.

1. *Migraine.* This is the hereditary form of headache, more commonly known as sick-headache, attacks of which come on periodically; women being affected more often than men. This is the headache that "runs in families."

2. *Neurasthenic headaches.* These are the neurotic headaches of the nervous patient, the exhaustion headaches of nervous prostration. Many times these head disturbances are more of an unpleasant feeling than an actual pain, and they are found in a variety of nervous patients ranging from chronic worriers to victims of hysteria.

3. *Indurative headaches.* These are the so-called rheumatic headaches. In these headaches, the trouble is located and the pain experienced in the muscles, nerves and other structures of the scalp. As a rule, nodules and tender spots are found at certain points on the scalp.

4. *Blood pressure headaches.* Into this classification fall those head pains which are the result of high blood pressure, low blood pressure and other circulatory disturbances, including anemia, hardening of the arteries, etc.

5. *Toxic headaches.* Into this class fall a very large group of headaches based on all forms of intoxication, including poisons taken into the body with food and those formed within the body, or unduly retained within the system; embracing the headaches of colds, fevers and other acute diseases.

6. *Reflex headaches.* In this class belong those sufferings which are experienced in the head as a result of trouble in some other part of the body; chiefly in connection with the digestive system and other internal organs. Headaches resulting from some constitutional diseases also belong to this class.

7. *Organic headaches.* Under this head fall those headaches resulting from troubles in the eye, ear, nose and throat, and organic diseases of the kidneys, as well as the headache of syphilis, brain tumor, meningitis, epilepsy, etc.

Combination headaches. Probably one-third of our headaches represent a combination of two or more of the foregoing general classes of head pains. This is what renders it difficult always to determine the probable causes of a given headache—they are not always so easy to classify and recognize in actual practice. Again, at one time a person may have a headache of

one sort while at another time he may suffer from a headache of an entirely different kind.

HEADACHE CAUSES

Having classified all headaches into seven groups, it will now be in order to study the chief causes operating under these seven heads. It is, of course, out of the question to give consideration to all of the known causes of pain in the head; but we will undertake briefly to discuss the leading or more common influences which are concerned in producing headaches.

I. Migraine Headaches

1. *Heredity.* There is no question about the legacy of headaches. With the same certainty that nervous disorders are to be found throughout an ancestral tree, so certain forms of headache are handed down from one generation to another. Sick headaches are certainly hereditary.

2. *Toxins.* In addition to heredity, certain toxins and poisons are also recognized as influences in causing attacks of sick headache or migraine. Infected tonsils and abscessed teeth may contribute to the production of these headaches.

3. *Stress and strain.* Nervous stress and mental strain are also responsible for precipitating headache seizures in those individuals who are predisposed by heredity on the one hand, and who are poisoned by the toxins of chronic constipation and focal infections on the other.

4. *The ductless glands.* Possibly the secretions of the ductless glands (hormones) are also concerned in the production of "sick headaches." The thyroid and other glands may be active as exciting causes in migraine attacks. Some cases may also be due to a cramped and enlarged pituitary gland.

II. Neurasthenic Headaches

1. *Heredity.* While neurasthenic headaches are not directly hereditary—as in the case of migraine—nevertheless, the underlying neurotic state is largely a matter of inheritance; so that the general tendency or predisposition to nervous headaches is hereditary.

2. *Mental states.* Among the many causes of headache, we must not overlook certain mental influences, such as *worry, grief, fear, anger,* etc., all of which, through their direct influence upon the nervous system and the circulation, are con-

cerned in producing many forms of both nervous and congestive headaches.

3. *Psychic strain* will produce severe headache. This is likely to be frontal, and generally is the result of long-continued worry or severe mental effort. Indecision and anxiety contribute to causing headaches of this sort.

4. *Brain fag.* Partial or complete nervous exhaustion is responsible for some of the most distressing and persistent headaches or chronic head sensations. Such sufferers are sometimes only relieved by three months' complete rest in bed.

5. *Study.* We should not overlook the fact that ordinary study—commonplace mental effort—is entirely sufficient to bring on a distressing headache in these neurotic individuals. Some folks simply can't study hard without having a headache. Many of these cases, however, can be greatly helped by having their eyes properly fitted with glasses.

III. Indurative Headaches

1. *Rheumatism.* Rheumatic or indurative headaches are associated with indurations about the insertions of muscles at the base of the skull. The pain disappears as the indurations are removed by massage. Great sensitiveness to touch is observed—and in some ways these cases resemble stiff neck or wry neck. There is nearly always present infection in some part of the body.

2. *Exposure.* These are the sort of headaches that are thought by some authorities to be caused by exposure to cold as well as by infection. It is a common experience to have a series of headache attacks of this sort brought on by exposure to a snow storm or other inclement weather.

IV. Blood Pressure Headaches

1. *Anemia.* Anemia is often associated with headache. However, it should be remembered that certain blood changes may persist for months before headache appears as one of the symptoms. But if the iron content of the blood is much reduced for a considerable time—sooner or later—headaches appear.

2. *Blood-states.* Aside from the anemias, attention should be called to certain blood-states which may be associated with headaches. A super-abundance of blood—a plethoric condition may produce headaches as may also impoverished condi-

tions or decreased hemoglobin. The viscosity or coagulability of the blood is also thought to be responsible for headaches in some cases.

3. *Circulatory causes.* Although circulatory disturbances are found associated with migraine and other forms of headache, there remains a group of head pains which are produced exclusively by circulatory behavior. These so-called congestive headaches are accompanied by flushing of the face and reddish blotches also often appear over the body.

4. *Blood in the head.* Too much blood in the head causes a throbbing ache which is only relieved by the mechanical distribution of the blood in the skin of the lower extremities.

5. *Cerebral arteriosclerosis.* Of the general symptoms of cerebral arteriosclerosis, headache stands first. It is usually dull, not throbbing, and quite often is described as a feeling as though a tight band were compressing the head. It occurs most frequently in the morning, after walking about, and diminishes as the day advances; except in syphilis, in which it is usually most severe at night. There is danger of confusing this head pain with the morning headache of neurasthenia.

6. *Arteriosclerosis.* Headaches sometimes accompany this condition when the kidney is extensively involved. Arteriosclerosis in and of itself usually produces no pain in the head.

7. *Altitude.* Headache is very often caused by change of altitude or climate. The removal of a person from sedative to bracing conditions, and, even more frequently, vice versa, commonly brings about changes in the vascular pressure, which, in the absence of adequate reactive power in the individual, very frequently cause headache and depression.

8. *Solar heat.* Insolation with or without sunstroke may be listed among the causes of headache. The previous history of being out in the hot sunshine—with red face and throbbing temples, is usually sufficient to clear up any difficulties in the diagnosis.

V. Toxic Headaches

1. *Acute conditions.* There are numerous acute situations in which headache is a prominent symptom. An attack of biliousness is an illustration of the type of disorder referred to. Common colds are often accompanied by severe headaches—even when fever is absent.

2. *Fevers.* Headache, as a symptom of disease, is nearly always present in acute fevers; as well as in the eruptive diseases. It is probably the result of nervous sympathy and toxic influences.

3. *Acidemia.* In such instances as an increased acidity of the body's fluids, as indicated by certain reactions, such as the estimation of urinary acidity, we often find persistent head pain which is only relieved by decreasing the acidity. This change can be temporarily effected by taking small doses of soda; permanently by eating more fruits and vegetables.

4. *Constipation.* The well-known headache of sluggish bowels is familiar to most persons. Sometimes the headaches resulting from an overfilled bowel are due to the absorption of poisons (autointoxication) and sometimes it is purely mechanical—reflex; as shown by the fact that a copious enema affords instant relief. With the cure of constipation, the headache disappears.

5. *Fatigue.* Fatigue and even hunger often produce headaches (probably due to the circulation of certain poisons associated with fatigue), whose cause is made obvious by improvement when rest and food are enjoyed. If you are subject to headaches of this sort, take pains to avoid overdoing.

6. *Indigestion.* The slow emptying stomach, partially digested foods, and the resulting abnormal fermentation of foods, often produce headaches. The sufferer usually has discovered the prompt relief obtained by the emptying of the stomach of its fermenting mass. Various forms of mouth disease, gastrointestinal disorders, intestinal parasites, appendicitis, dyspepsia (biliousness), and gall-bladder infection may be the cause of severe pain in the head. Dull, generalized headache and coated tongue are usually due to so-called indigestion.

7. *Kidney disorders.* One of the early signs of beginning failure of the kidneys, as in Bright's disease, is a headache of a peculiar type, due to accumulation in the system of the poisons which it is their duty to get rid of.

8. *Gout.* Headaches, which are present in attacks of gout, only disappear as improvement in the disease takes place.

9. *Poisons.* Such poisons as lead, morphin and alcohol are often accompanied by headache. The headache following a drinking debauch is well known; lead and morphin poisoning present other symptoms more marked, although headache is usually present in more or less degree.

10. *Pregnancy.* Headaches of pregnancy should not be allowed to continue unobserved by the attending physician. It is an early symptom of retained poisons and if early reported, quick relief is usually obtainable.

11. *Goiter.* Exopthalmic goiter is often accompanied by headaches. These head pains may be due to the excess of thyroid secretion in the circulating blood. This substance is toxic to the heart and may also be to the nerves and coverings of the brain.

VI. Reflex Headaches

1. *Luxuries.* The luxuries of a larger proportion of mankind have increased and in a corresponding ratio, nervous prostration is the penalty we pay for our indulgence. The sensual pleasures in life which make such inroads on our strength and powers of endurance, are alarming to contemplate. First the influence of excitement and over-stimulation, and then the influence of headaches and exhaustion.

2. *Hunger.* We should not overlook the fact that hunger produces a form of headache in certain nervously predisposed individuals.

3. *Indigestion.* Many forms of indigestion are able to set up reflex headaches. Some nervous persons have a pain in the head if solid or semi-solid matter is allowed to linger in the lower bowel or rectum. Many such headaches are wholly nervous reflexes—and are not due to autointoxication as popularly believed.

4. *School work.* Headache is a common disturbance among school children, and may be due to any one of several causes, among which are overwork—producing irritability and disturbances of cerebral circulation—indigestion, bad air, eye strain, etc. The eyes should always be examined when headaches are persistent, and any defect corrected by proper glasses. Frequent bleeding from the nose may occur in association with headache.

5. *Constitutional disease.* Severe or long-standing constitutional disease, such as tuberculosis, cancer, diabetes, etc., may result in producing chronic headache.

6. *Displaced internal organs.* Headaches are sometimes reflexly produced by displaced and sagging internal organs—stomach, bowel, kidney, uterus, etc. It is only in highly nerv-

ous persons that such causes are responsible for severe headaches. Only rarely does so-called "female complaint" cause headache.

7. *Menses.* Headache may or may not accompany puberty. In most neurotic young girls it often puts in its appearance to a greater or lesser degree. Among the neurotic types, at each periodic phenomenon headache is a factor along with nausea and vomiting. Headaches often continue throughout the experience of such individuals, relief only coming at the menopause.

8. *Menopause.* In another group of women headaches put in their first appearance at the menopause. The menstrual function normally should occur without symptoms and without headaches.

9. *Remote disorders.* It is a well-known fact that the sympathetic nervous system is able to refer pain from one part of the body to another. That is, the disorder responsible for a headache may often be located in some other and remote part of the body.

10. *Miscellaneous.* Heavy hats, artificial hair, loud and unusual noises, hot stuffy rooms, cancer of the tongue, unusual heat and cold and even a low barometer, may cause headaches.

VII. Organic Headaches

1. *Adenoids*—are a common cause of headache in children and adolescents.

2. *Tonsilitis.* Rhinitis and tonsilitis are often accompanied by headaches which are rarely the chief complaint of the patient. These headaches usually lessen in their intensity with the relief of the offending cause.

3. *The nose* causes a pain that lies to the inner side of and extends higher on the forehead than the pain, due to eyestrain. A crooked nasal septum as well as enlarged turbinates may cause a persistent headache.

4. *Sinus infection.* Diseases in the accessory nasal sinuses are also causes for headaches. The sinuses affected are the frontal, antral, ethmoidal and sphenoidal. Headache due to disease of these sinuses is generally relieved by the discharge of pus or mucus from the nose. In these conditions, the seat of pain is generally frontal.

5. *Ear troubles.* Otitis Media (earache) headaches are

usually one sided pains and the progress of the disease is often indicated by the severity of the pain. Mastoid disease may also cause headaches.

6. *The eyes* produce the so-called ocular headaches. In these headaches the pain is, as a rule, more severe on using the eyes. The principal eye conditions giving rise to headaches are errors of refraction. Ocular headaches are usually located over the middle of the eyebrow and the pain radiates into the back of the eye.

7. *Teeth.* Headaches not infrequently result from impacted, decayed, or abscessed teeth which should receive the attention of the dentist. Decayed eye teeth are especially known to produce frontal or temporal headache.

8. *Inflammations.* Congestive areas associated with such acute conditions as sinusitis, antrum troubles, boils and carbuncles about the head or face, certain glandular enlargements, all may be accompanied with headaches.

9. *Lice.* Ordinary head lice are frequently the cause of the severe headaches observed in the children of the poorer quarters of our great cities. They come to our clinics suffering from pain in the head and are soon relieved after the head and scalp have had a good coal oil shampoo.

10. *Malaria.* Malaria is often associated with severe headache—and only subsides as the causative parasite is controlled by quinine.

11. *Meningitis.* The headache of meningitis is continuous and takes its place among the important symptoms of this disease.

12. *Neuralgias.* The head pains of neuralgias follow the distribution of the nerve involved. The most severe form is facial neuralgia.

13. *Syphilis.* The time of day markedly influences some headaches. Syphilitic headaches are usually worse at night, as are also the neuralgic type.

14. In *kidney lesions* the pain is felt particularly at the back of the head, and radiates down the neck. Torticollis (wry neck) and disease of the vertebræ should also be considered.

15. *Brain tumors* and abscesses are common causes of headache. The location of the pain often corresponds with the site of the tumor. Sometimes the pain is increased by pressure. It may not be constant, more generally it is periodic.

16. *Cerebral concussion.* Brain concussion from various accidents, as in a football game, results in terrific headaches.

17. *Epilepsy.* The warning dull headache of epilepsy is relieved as the attack passes.

18. *Pituitary.* A persistent form of headache is caused by enlargement of the pituitary gland, situated at the base of the skull.

TREATMENT OF HEADACHES

This discussion of the causes of headache is designed to make the reader intelligent respecting the many and varied influences which are responsible for this common form of human suffering. If you know the cause of your headache you are in possession of the secret of bringing about a cure. If you have a headache, go to work with your doctor on a still hunt to locate the cause or causes and stick to the job until you find them and remove them—if possible. In the meantime do not make the mistake of ruining your digestion and nerves, or of making your headache worse by the indiscriminate use of bromo seltzer, aspirin, acetanilid and other headache remedies.

While this is a book devoted more largely to the prevention of disease, it may not be amiss to offer a few practical suggestions regarding the home treatment of headaches. When we treat headache with drugs we must remember that the medicine only serves to benumb the nerves and thus to deaden their sensibility to pain. The real headache with its original cause goes marching on. Headache powders cure headaches in about the same way that chloroform kills the pain attending a surgical operation.

Remember that any drug that can stop pain instantly—any medicine which can relieve a headache almost immediately—I say, remember that such chemical poisons are injurious to the health and highly dangerous if used over a long period of time.

1. *Treatment of migraine.* Sufferers from nervous sick headache must avoid overdoing; they must shun all efforts which overtax and strain the nervous system. They should also shun all narcotics and stimulants, alcohol, tobacco, and even tea and coffee. Sufferers from this form of headache should be out of doors as much as possible, indulge in regular relaxation and should eat at least three regular meals a

day. It will be well if they would avoid eating too much meat. Sometimes when the stomach is highly acid the taking of a little soda, accompanied by a large enema for washing out the lower bowel, will help to abort or lessen the severity of the attack.

The hot foot bath is a very valuable remedy which may be employed in relieving attacks of migraine. It is sometimes further helped if an ice bag is placed about the head and back of the neck. Probably the greatest single remedy to be employed in this form of headache is rest in a dark room.

In case the enema is used for emptying the lower bowel, it should be employed very hot, two quarts of water ranging in temperature from 105° to 110° F. In order to avoid the debilitating effect of this heat upon the bowel it is best to finish this treatment with one pint of cool tap water.

If you are going to lessen attacks of migraine you must avoid becoming excited and angry, and you must get over the feeling of being rushed.

Most migraine patients are benefited by a diet that is rich in fruits and vegetables, and which contains a small amount of meat or protein. Some patients cannot even tolerate large quantities of milk.

These are the people that should cultivate the habit of having two regular bowel movements a day. Constipation seems in most cases to aggravate the migraine tendency.

2. *Neurasthenic headaches.* In the case of the victims of neurasthenia, nervous exhaustion, and brain fag, any overexertion, worry, or grief, anxiety or other psychic strain, will serve to bring on a characteristic headache.

In the treatment of exhaustion headache we must remember that sleep and rest are essential, and it is also necessary carefully to avoid all stimulants and narcotics. Many times the sense of pressure associated with these headaches is immediately relieved by rubbing on a five or ten per cent menthol ointment.

Moderate exercise in the open air is beneficial and the hot foot bath (110° F.) given for ten or fifteen minutes, followed by a dash of cold water to the feet, is also helpful.

Sometimes these headaches become so persistent that they are only cured by a period of four to six weeks complete rest in bed.

Massage or gentle stroking or rubbing of the scalp is beneficial in many of these cases.

The headaches associated with hysterical attacks are more difficult to relieve and are sometimes best treated by applying hot fomentations to the top of the head for ten or fifteen minutes. They are also sometimes greatly benefited by general hot baths.

3. *Rheumatic headaches.* The treatment of indurative or rheumatic headaches is best carried out by means of heat and massage. Hot fomentations or hot air from an electric air blower is one of the best means of applying heat to the head. If it is available, diathermy is very helpful in these cases, followed by skillful massage, although ordinary rubbing will be found almost equally beneficial.

4. *Blood pressure headaches.* The congestive headaches of high blood pressure, in which the face is flushed and the patient complains of a "splitting headache," are best relieved by the combination of generous ice water compresses about the head, face, and neck, in connection with a prolonged hot foot bath. Rest in bed, with elevation of the head and shoulders, is helpful; and it also aids to apply an ice bag to the back of the neck.

In the case of the pale faced or anemic headaches, we have a condition in which there is too little blood in the brain. These cases are best treated by applying heat to the scalp and the back of the head and neck. Rubbing the head also is of assistance. Many times these anemic headaches are best relieved by the alternate application of hot and cold compresses, and of course, in the end, they are cured by proper diet, outdoor living, and the administration of iron.

The headaches of high blood pressure are best managed by keeping the feet and legs warm, the bowels open, and the head cool. When headaches of this sort become persistent, it is best for the patient to go to bed for a few days to enjoy complete rest, meanwhile subsisting on a very limited diet, such as buttermilk.

5. *Toxic or reflex headaches.* In headaches due to poisons of any sort, it is well to give an abundance of water; wash out the lower bowel by means of copious enemas, while cold compresses are applied to the head, and heat to the feet. Sweating baths are helpful in this form of headache as well as appli-

cations of heat over the liver. The so-called "bilious headache" probably belongs to this class.

Some people have pains in the head which are merely an expression of trouble in some other part of the body, and these reflex headaches are best treated by removing the cause, or by applying remedies to the real seat of the difficulty, whether it be the sedentary life, menstruation, indigestion, constipation, or other internal derangement or constitutional ailment.

This is equally true of headaches due to organic disease. There is little gained by applying local remedies to the head. The real cause must be discovered and treated.

CHAPTER VI

BACKACHES AND THEIR MANAGEMENT

The causes of backaches are many, and the explanations and reasons therefor, as given by both the patient and the physician, are almost equally numerous. Those who suffer from backache are quite likely to blame it on some recent experience or some minor accident; while the physician is quite likely to explain the trouble in accordance with the theories of his chosen specialty.

Unquestionably most of our backaches are wholly or partially of nervous origin. When we have a case of flabby muscles plus a flabby mind, there is going to be pain around the poorly supported joints of the lower spine, or where the spine joins the pelvis.

One thing is certain, very few of our common backaches, in the case of women, can be charged up to pelvic disease or so-called "female complaints," as was the custom in former years.

Most long continued chronic backaches belong either to the neurotic or pressure group. They are due either to constitutional nervousness, or to disease pressure of some kind in or near the spinal column.

Cabot found, in the order of the frequency of their occurrence, backaches to be due to the following general causes:

1. Fatigue and defective balance.
2. Childbirth.
3. Infectious diseases.
4. Pain following surgical operations.
5. Sacro-iliac joint defects.
6. Lumbago.
7. Arthritis.
8. Herpes zoster, or shingles.
9. Acute sprain in the back.
10. Kidney stone.
11. Spinal tuberculosis.
12. Miscellaneous kidney infections, malignant diseases of the spine, etc.

CLASSIFICATION OF BACKACHES

From the standpoint of the recognition and the prevention of backaches by the layman—from the standpoint of home treatment of back pains—we think it best to divide all of the known backaches into six general classes, as follows:

I. Neurotic Backaches

This is the group of back pains embracing the nervous backaches and those which take their origin in constitutional weakness and general debility, and in this class may be included the following distinct and well recognized forms of backache.

1. Fatigue backache—simple weariness.
2. Exhaustion backache—nervous exhaustion.
3. Habit backache—chronic introspection.
4. Sprained back—debility and relaxation.

II. Lumbago Backaches

It must be remembered that not all backaches are lumbago. In this group is to be found not only the backache of true lumbago, but also an associated group of true backaches due to real spinal joint trouble—that group of backaches which physicians sometimes put in the "orthopedic group." The backaches of this group include the following:

1. True lumbago—myalgia or muscular rheumatism.
2. Wry neck—stiff neck or torticollis.
3. Spinal arthritis—real vertebral rheumatism.
4. Joint backache—sacro-iliac joint trouble.

III. Pressure Backaches

Into this group are put the so-called surgical backaches and those back pains due to diseases of various sorts, which, because of their nature and location, are able to produce compression of the spinal cord or some of its branches. These pressure-producing disorders may be more specifically named as:

1. Cord backache—compression of the spinal cord.
2. Tumor backache—pressure from growths.
3. Pott's disease—tuberculosis of the vertebrae.
4. Post-operative backache—tired muscles.

IV. Reflex Backaches

These are so-called referred backaches, and embrace the pains that are supposedly produced by trouble in some other part of the body, which disorders, by means of the sympathetic nervous system, are able to produce some form or other of backache. Such backaches are no doubt sometimes due to tumors, inflammations, etc., located in the pelvis, as well as such disorders as gallstones. In this group the following are included:

1. Kidney backache—stone in the kidney.
2. Gall-bladder backache—gall stones, etc.
3. Visceral backache—prolapsed organs, etc.
4. Pelvic backache—disorders in the pelvis.
5. Periodic backache—menstrual back pains.
6. Eye-strain backache—disorders of vision.

V. Toxic Backaches

Backache is one of the symptoms of most acute infectious diseases, and other disorders which are largely due to toxins circulating in the blood; more specifically the following groups may be named:

1. "Cold" backache—pains of common colds.
2. "Flu" backache—back pains of influenza.
3. Infection backache—acute infectious diseases.
4. "Shingles" backache—Herpes zoster.
5. Acidemia back pains.

VI. Miscellaneous Backaches

In addition to these five quite well defined groups of backache, we have a group of miscellaneous backaches which it is quite difficult satisfactorily to classify. They are therefore included under this caption:

1. "Labor" backache—pains of childbirth.
2. Obesity backache—the pendulous abdomen.
3. Spinal neuritis—sciatica and neuralgia.
4. Backaches due to errors in dressing.
5. Posture backache—wrong methods of standing, sitting, etc.

THE TREATMENT OF BACKACHE

In general, backaches are relieved by rest, massage, or rubbing, and by applications of heat, the hot water bag, electric

light heat, sunlight, etc. Many times backache can be relieved by taking physical exercise designed to strengthen the spinal muscles.

Some backaches are due to infection, to abscessed teeth, and other sources of toxic poisoning. One thing is certain, porous plasters probably have little or no influence of a curative nature on backache; their influence is largely suggestive—mental.

The backache associated with nervous exhaustion or neurasthenia is best treated by improving the patient's general nervous tone, though massage, vibration and alternate hot and cold applications are very helpful for the purpose of affording temporary relief. In case of backache associated with constitutional debility, we can be quite sure that the trouble in the spine will remain until the patient's general nerve tone is improved.

Lumbago is a form of backache in every way similar to stiff neck or wry neck, and is best treated in its earlier stages by rest, and in its sub-acute or chronic stage by means of menthol liniment and massage; the vacuum or cupping treatment is also very helpful in lumbago. The application of the incandescent electric light or better, the arc light and diathermy, is very helpful in these cases.

In the case of persistent pains in the back, X-ray pictures should always be made to make sure that tuberculosis is not present.

We must remember that some forms of backache, like headache, are reflex—that is, stones in the kidney and gall-bladder can produce this trouble, and the treatment must be directed toward the removal of the exciting cause. Some backaches due to sagging of the internal organs are helped by wearing a properly fitting abdominal support. Many backaches are cured in this way. In the case of obese persons, the backache is relieved sometimes by merely reducing the weight of the abdomen, as the backaches were caused by the strain of carrying around a pendulous abdomen.

RELIEVING PAIN WITHOUT DRUGS

Before we pass by headaches and backaches, it might be well to say a word about their general management—in fact, the treatment of all forms of pain—by means of various physical agencies. It is not generally known that we have more than a score of drugless pain killers. If we stop to

recall the fact that many forms of heat and cold will relieve suffering it will help us to refrain from the commonplace use of so many drugs which are employed for the purpose of relieving pain. Among the more common physical agencies which can be employed for the relief of pain we may mention:

1. *The hot water bag.* The ordinary hot water bag, when filled with near-boiling water and covered with a towel or a piece of flannel, is one of the best known methods of relieving ordinary superficial pains.

2. *Hot sand bags.* Heavy canvas bags filled with ordinary sand and heated in the oven may be wrapped in a towel or blanket and applied to the painful area just the same as is the hot water bag.

3. *Fomentations.* One of the most useful of all ordinary methods which can be used for treating most forms of pain is the fomentation—a piece of woolen blanket wrung out of boiling water.

4. *Hot Sponging.* Pain, as it is sometimes accompanied by great nervousness and restlessness, is often more effectively relieved by hot sponging than by either the hot water bottle or the fomentation.

5. *Radiant heat.* The radiant heat from an ordinary incandescent electric light is a very effective means of relieving many forms of pain.

6. *Sunlight.* The direct rays of the sun are valuable when they are allowed to fall upon the seat of pain. This method is especially serviceable during the summer season.

7. *Hot air and flame heat.* Hot air, as from an electric blower, or even from the flame of a candle, is very serviceable in treating many forms of pain.

8. *Arc light.* The arc light, when it is available, is one of the most valuable of all physical remedies for the treatment of pain.

9. *Alternate sponging.* Many times when pain does not yield to either hot or cold, the alternate hot and cold sponging will afford almost immediate relief. This is especially true when treating deep-seated pain, and we also know that in some cases where the pain is due to great inflammation that the cold rubbing alone is valuable.

10. *The ice bag.* In the treatment of pain that is deep seated or due to a high grade of inflammation, the application of the ice bag is sometimes very comforting.

11. *Poultices.* The old-fashioned poultice, although mussy and unclean, was nevertheless an effective means of relieving pain.

12. *The general hot bath.* In these days almost every home has a bath tub and we should not overlook the fact that the general hot bath is a very valuable means of relieving not only general but sometimes even localized pain.

13. *The hot foot bath.* In the treatment of many forms of headache and other forms of pain, the hot foot bath is very valuable.

14. *The hot enema.* In many abdominal pains, where such treatment would not be contra-indicated, the hot enema is very helpful in relieving pain. Especially is this true of gallstone or kidney stone pain, as well as certain forms of neuralgia.

15. *Diathermy.* This new form of generating heat within the tissues is a very valuable means of relieving deep-seated pain, as in the case of neuritis and neuralgia, and is helpful in many forms of headache and backache.

16. *Rest and position.* We must not overlook the value of absolute rest as a means of relieving pain. Many forms of pain will soon pass if the part is given reasonable rest.

CHAPTER VII

WHAT IS A COMMON COLD?

Of all the minor maladies affecting the civilized races, common colds are undoubtedly the most widespread and distressing. We also know that colds in the head, chronic catarrh, and the "flu" are often forerunners of more severe maladies; and that ofttimes they lay the foundation for various deadly diseases, including tuberculosis and pneumonia, together with serious disorders of the nervous system, and grave diseases of both the heart and the kidneys.

Colds are not only responsible for an enormous annual pecuniary loss, but they result in untold inconvenience, in that they often seriously interfere with the fulfillment of business, professional, and social engagements.

WRONG VIEWS OF COLDS

The time has come for intelligent people to take common colds seriously, for when they are severe and frequent—when they manifest a tendency to "hang on"—they may lay the foundation for numerous chronic conditions of both the nose and the throat.

Severe colds, when persistent and neglected, may do much toward predisposing certain weakened and debilitated individuals, who possess a low degree of vital resistance, to bronchitis, pneumonia, pleurisy, and even tuberculosis.

Webster defines a cold as follows: "An indisposition occasioned by exposure to cold or to a draught of cool air or to dampness; an acute attack of catarrh; as, to have a severe cold."

It is little wonder that the common people have perverted notions and distorted ideas respecting the nature and cause of colds, when the makers of our dictionaries offer the foregoing definitions as expressing the correct conception of a common cold.

It is apparent from this definition that the old-time notion

that colds owe their origin to rainy days, dampness, exposure, cold air, and draughts, has not been successfully refuted by the modern germ theory. These conditions of temperature, air, and moisture, are usually but contributing factors in the causation of common colds. Further, these climatic influences, which are ordinarily regarded as the real cause of a cold, as a rule, exert but a secondary influence in producing the pathological conditions commonly described under the terms coryza, acute catarrh, and common colds.

HOW COLDS START

In the use of the term "colds" we usually refer to an acute infection or inflammation in the head, characterized by a raw dryness in the nose, and accompanied in the early stage by sneezing, chilliness, shivering, fullness in the head; and later by muscular pains, dry skin, constipation, impairment of the senses of taste and smell, varying mucus discharge (becoming purulent in two or three days), more or less sore throat, sometimes cough, hoarseness, headache, fever, etc. The nose secretion, at first watery, changes to a whitish mucus, and later becomes a gray or yellow pus and mucus.

At least these are the symptoms of the kind of cold you must take seriously enough to go home and go to bed, send for the doctor, and stay in bed until you get well. These are the sort of colds that cause kidney and heart disorders—rheumatism etc.

It is not always necessary to take colds so seriously when they are wholly confined to the nose and throat—when they are not accompanied by constitutional symptoms such as fever, chilliness, general muscular pains, hoarseness, cough, etc.

We should also take seriously any cold which tends to "hang on"—it is probably a symptom of some more serious disease. The average cold runs from seven to ten days.

The same group of symptoms which mark the early stages of a cold, also ushers in numerous infectious diseases, including diphtheria, typhoid fever, smallpox, scarlet fever, whooping-cough, measles, pneumonia, and influenza. "Chills and fever" constitute a group of symptoms which mark the beginning or early stages of practically all the common, acute, infectious diseases. All children exhibiting symptoms of a "fresh cold" should be taken out of school and properly iso-

lated from the family until either time or the doctor pronounces them free from some contagious disease.

CLASSIFICATION OF COLDS

Observation and study have led us to believe that there are five great classes of colds.

1. *Colds due entirely to some specific infection.* This group of colds includes the milder forms of influenza or "grippe," a malady which especially affects the nose, throat, and the respiratory passages. There are various colds other than influenza which also belong under this head. In fact, practically every cold is a case of the individual's succumbing to the attacks of some cold germ, varieties of which are ever present on the mucous membrane of the nose and throat.

It is highly probable that no amount of cold bathing and other commonly advised preventives of colds will always serve to prevent one from contracting these infectious colds. They strike individuals in the neighborhood with the unconcern and impartiality shown by measles or mumps, when these maladies are abroad in the community. These infectious colds sometimes become epidemic, and it is quite likely that the individual's general physical state has but little to do with their contraction.

2. *Colds due primarily to circulatory disturbances.* This group of colds is largely preventable by means of the proper adjustment of the clothing, by avoiding draughts when fatigued, by preventing chilling, exposure, cold feet, wet feet, etc. Certain individuals afflicted with an unstable circulation, having a pale skin with slow and sluggish blood movement, with habitually cold hands and feet, find themselves very easily and quickly chilled when some portion of the body is subjected to slight draughts or when otherwise exposed to rapidly cooling influences.

3. *Colds largely due to deranged nutrition and disordered metabolism.* Another group of colds, some authorities believe, is caused, directly or indirectly, by certain disorders of digestion and derangement of nutrition. The victims of chronic dyspepsia and constipation suffer more or less from acidemia, a bodily state in which an abnormal amount of certain acids are circulating in the blood. This acid condition of the blood stream is not only irritating to the mucous membrane of the nose, throat, and lungs; but it also cripples the action of

the white blood cells, whose work of destroying germs is so vitally connected with the prevention of colds and the preservation of health.

4. *The neurotic and hay-fever type of colds.* In addition to the colds caused by germs, we certainly have another group of nasal disorders which are produced by disturbances of the chemistry of the blood and by certain other substances which are able to set up an inflammatory reaction in the mucous membrane of the nose, producing a profuse watery discharge in connection with other distressing symptoms. We very much doubt if microbes have anything directly to do with the production of colds belonging to this group.

Many of the colds belonging to this group—which are not true hay-fever—are due to a deficiency of calcium in the blood. Such attacks of winter colds will be prevented, in the majority of cases, by taking a few doses of calcium lactate, or by using calcium phosphate on the food—just as you use common table salt—for a few weeks. Most of these patients would do well to use a little calcium phosphate regularly. It is harmless and effectually prevents many of these nose and throat troubles. Table salt is now on the market which contains both iodin and calcium.

5. *Diphtheroid colds.* We are coming more and more to recognize that in the case of certain children—and adults too, for that matter—many sore throats and even colds in the head belong to the diphtheria group; that is, they are caused by some form of diphtheria bacillus. Now in recent years we have come into possession of the means of recognizing this form of sore throat—the Schick test. Your physician can obtain a diphtheria toxin which he can inject just beneath the upper layer of the skin, and your reaction to this injection will determine whether or not you are susceptible to diphtheria, or diphtheroid colds and sore throats, and if the test should show that you are susceptible, you can take a small immunizing dose of diphtheria toxin-antitoxin, and that trouble will be over for a year or more—possibly for several years.

MOST COLDS ARE "CATCHING"

While some colds are probably not contagious—most of them are. The sneezing which usually accompanies the "catching of a cold" is a symptom of the first stage of the disease,

it is evidence of the cold you already have. Both chilling and sneezing are indications that you already have a cold, that the infection has taken root; the germs have begun to multiply, the mischief has begun to spread.

All the evidence points to the fact that the ordinary household malady described under the term of a common cold is an infectious disease, and it should be treated and regulated accordingly.

Further reasons for regarding most colds as being caused by certain microbes which take advantage of the disturbance of one's circulation or the derangement of one's nutrition, may be cited as follows:

1. Colds are shown to be contagious, and therefore caused by germs: by the simple fact that they are "catching," one can take a cold from another person who has a cold.

2. Severe colds always begin with a sensation of chilliness followed by more or less of a fever—chills and fever. That is the identical manner in which practically every infectious disease caused by microbes begins its career.

3. Like all germ-caused diseases, colds have a tendency to run a more or less definite course. They are self-limited; that is, after a certain time, they usually begin to recover of themselves. In this way a cold behaves exactly as do measles, chickenpox, scarlet fever, pneumonia, etc.

4. Like other infectious diseases, colds may be followed by inflammations in various internal organs, producing a congestion of the lungs, liver, spleen, or kidneys. These secondary results are due to the irritating effects of the poisons (toxins) of the germs circulating in the blood stream of the patient.

5. Colds, like other contagious maladies, can be prevented, controlled, and regulated by isolation and quarantine; and we should hasten the time when they will be thus sensibly regarded and scientifically treated.

6. That common colds are of an infectious nature is further suggested by the well-known fact that a severe cold seems to confer a short-lived immunity upon its victims. That is, a healthy, robust person who is just recovering from a very bad cold is not likely to have another such attack for several months, maybe not for a full year. Some folks have their regular colds once each winter; then they are seldom bothered for another year.

ABOUT SUMMER COLDS

There is just as much danger of some folks catching cold in the summer as in the winter. In some respects, more. The only reason we suffer more from colds in the winter, is that we live indoors more, and hence breathe more foul air. This probably explains why we have more colds in the spring of the year. We are more likely to catch cold because we have been more or less shut up indoors all winter.

The ideal conditions for catching cold are found on a cool summer's evening, when the body is tired, the vitality is pretty well used up, and the skin and underclothing are slightly moist from perspiration. These are just the conditions for producing a disturbance of the circulation. Especially is it dangerous to ride in open cars on cool evenings without wraps.

Should you find any portion of the body becoming chilled, such as the back of the neck, vigorously rub it or stiffen the muscles connected therewith. Draughts are especially dangerous at night when one is tired out and perspiring.

Summer sore throats may be aggravated by taking large quantities of ice water or ices, when the body is overheated or when the throat is congested from public speaking or singing. One should be particularly careful about lying down on the porch in the cool of the evening without suitable covering for the body.

Many of these frequently recurring summer colds belong to the hay fever group or to the calcium deficiency class and should be dealt with accordingly.

CATARRHAL FEVER

It has been suggested by someone that we should take influenza, grippe, and common colds, put them in a class, and call the whole group *catarrhal fever,* for we must frankly admit that we are frequently confronted with the case of a patient coming down with an infection and neither from the early symptoms, nor from observing it for a number of days, are we able honestly to say whether we are dealing with a case of influenza or grippe, or whether the patient simply has a severe common cold.

Some day we may have these processes more scientifically classified, after we have found out more about their germ-causes. All we can say now is that these colds are caused by

one or more forms of "virus," and whether this virus is always some form of bacillus and its toxins, or whether there are other and as yet undiscovered ultramicroscopic living or chemical bodies which can cause these colds, after the fashion of pollen irritation as the cause of hay-fever, we do not know. We are all looking for more light as to the cause of colds, and better methods of treatment will probably have to await further discoveries in this direction.

It should be understood that the microbes found in connection with ordinary colds are of a very common sort—they are almost everywhere present and may be found almost any time on the healthy mucous membrane of the nose and throat of the average individual, so that the cause of colds, be it "virus"—whether living or chemical—seems to be always present with us.

The trouble is that colds belong to that group of diseases which, like diphtheria, confer but a short-lived immunity. After an indivdual has had a cold he is secure from another attack for a period of only a few months—usually not more than a year.

It should be added, in this connection, as the result of our experience in the last influenza epidemic and the more recent study of colds, that we have less and less faith in throat gargles, liquid antiseptics, etc. They may be of some value in the very early stage of the cold, but their germicidal function is doubtful.

ACIDEMIA IN RELATION TO COLDS

In recent years, careful study of colds, influenza, etc., has convinced us that during and just previous to these infections the body fluids are nearly always highly acid, and it has become our practice the last few years to administer some form of alkali, methodically, in the early hours of a threatened cold or attack of influenza. The alkalies are administered after the following general method: We have the patient take a glassful of lemonade every two hours, to which a quarter of a teaspoonful of baking soda has been added; stir in the soda and drink while effervescing.

The liberal use of fluid is important in all cases of this, as well as of other fevers. From one-half to one tumblerful should be given every hour while the patient is awake. It may generally be prescribed in the form of liquid diet, given every

two hours, and a fruit drink (lemonade, orangeade, grape or raspberry juice and water) every two hours, alternating with food.

But the use of some form of alkali (soda), while it is of value as an immediate treatment when coming down with a bad cold, cannot be depended upon indefinitely to keep the acidity of the system down. It should be explained in this connection that when a fresh specimen of urine is analyzed, in the average person, it yields, according to the standard method of testing it, an acidity that is spoken of as 30 degrees. Now in connection with a cold, it is not uncommon to find acidity anywhere from 50 degrees to 100 degrees, or higher.

CHAPTER VIII

CAUSES AND PREVENTION OF COLDS

Colds may be divided into two classes; the predisposing, that is, those conditions of the body indirectly favoring colds; and the exciting, that is, the immediate or provoking influence producing the cold.

I. Predisposing Causes of Colds.

1. *Overeating and indigestion.* The practice of habitually taking into the stomach more food than is required to nourish and sustain the body results in overworking the digestive organs, clogging the system, and greatly overtaxing the organs engaged in the elimination of body poisons and waste matters —the skin, kidneys, etc. When in such a state as this, the body is ill prepared to fight hostile microbes and resist infectious colds.

2. *Excess of protein.* Occasionally we find an individual who is predisposed to catarrh and colds, because he is anemic and undernourished; either because he eats too little, or he does not assimilate his food, or his food is not nutritious and abundant. On the other hand, a large percentage of the sufferers from chronic and recurring colds are found among the high protein consumers, the heavy meat eaters.

The proteins are acid-ash producers and excessive acidity of the blood stream probably predisposes to "catching cold"; at least there are vast numbers of people who do not seem to be able to rise above the zone of chronic colds, until their system is rid of these irritating poisons.

3. *Calcium deficiency* is responsible for many colds which come on in the winter and which in many ways resemble attacks of hay-fever. Many of the colds accompanied by a profuse watery discharge from the nose belong to this class.

4. *Chronic constipation.* Either all alone or accompanying the foregoing conditions, constipation is certainly, in some measure, responsible for the annoying habit of catching cold so

troublesome to some people. It is a common bit of history to elicit from patients who are coming down with the grippe or a severe cold, that their bowels usually move quite regularly, but that for the past week they had been somewhat constipated. Sluggishness of the bowel, in the majority of cases, precedes the taking of cold.

5. *Errors in clothing.* Another of the predisposing causes of colds is the wearing of too much clothing. Many of the victims of recurring colds wear so much heavy woolen underclothing that they continually are perspiring, and thus they constantly expose themselves to the danger of chilling. The opposite extreme—the wearing of too little clothing and the consequent exposure and chilling which would inevitably follow—must result in greatly predisposing ill-nourished and otherwise susceptible persons to catching frequent and severe colds.

The habit of wearing thick furs over some portions of the body, as about the neck, should be avoided, except in the severest cold weather. Tight collars and tight neckbands favor congestion and sore throat. So-called "chest protectors" are a snare and a delusion. These devices invariably render their wearers more liable to contract colds.

6. *Inactivity of the skin.* This is undoubtedly one of the greatest predisposing causes of colds. The physicians of the next generation will pay more attention to the hygiene of the skin than we do at present. The skin is an organ of great importance when studied from the standpoint of colds.

When the skin is dry, rough, leathery, cold, and bloodless, it indicates that the internal organs and mucous membranes are more or less conjested and internal congestion is just the condition that favors taking cold. This condition of the skin is sometimes due to diminished secretion on the part of the thyroid.

7. *The sedentary life.* There can be little doubt that the indoor life predisposes to colds. Sedentary workers are subjected, as a rule, to an overheated atmosphere during the winter. They are usually compelled to breathe foul air, which irritates the nose and throat and favors infection and subsequent inflammation of the mucous membranes.

Again, lack of physical exercise results in the sluggish circulation of the blood through both muscles and skin, and this all favors the taking of cold, when persons in such circum-

stances are momentarily exposed to draughts or other chilling influences. Likewise, the inhalation of smoke and other irritating gases from locomotives or manufacturing plants tends to irritate the nose and throat, and predisposes to colds.

8. *Lowered vitality and fatigue.* All persons suffering from lingering and wasting diseases, together with those having lowered vitality from whatever cause, are predisposed to recurrent colds. One is also more likely to catch cold when fatigued, as in the evening after a day's hard work, or after having undergone some severe physical or nervous strain.

Any scheme for preventing colds which does not aim at the development of the vital resistance—at increasing one's powers of reaction to infection—is doomed to certain failure. Any and all influences which in any manner lower the vital resistance, greatly increase the likelihood of taking cold.

By far the majority of common colds are contracted at night, when the body is wearied and the vital resistance is somewhat lowered.

9. *Alcoholic excesses,* tobacco-smoking, and various other physical habits which may interfere with the individual's health by decreasing the vital resistance, or over-acidifying the blood, all favor the development of that bodily state which predisposes to catching cold.

It is a fact not generally understood that the constant use of the various narcotics tends to decrease the alkalinity of the blood. When the alkalinity of the blood is decreased, the vital resistance is proportionately lowered; and when the vital resistance is decreased, the individual's susceptibility to all acute infections—including common colds—is increased greatly.

10. *The mental state.* There can be little question, from our knowledge of the influence of the mind on the circulation of the blood—especially blood movement through the skin—that a person's mental state may often act as a predisposing cause of colds.

Victims of grief, fear, and chronic worry, usualy have pale skins; and in this way, by its influence upon the skin-circulation, the mind itself may contribute to that disturbance of the circulation which so predisposes to the catching of colds. The fear of night air formerly had the dignity of a popular superstition, and was erroneously supposed to favor taking cold. Night air is colder than day air, more chilling; and only

because of this fact, can night air ever be truthfully charged with causing colds. Proper and sufficient clothing will effectually rob night air of all its cold-terrors.

Men of courage and women of faith are not, other things being equal, so predisposed to colds and other infectious ailments as are the downcast and despondent victims of fear and grief.

The successful man, the one who lives the triumphant life, the man of victory, as a rule, is comparatively free from colds and numerous other little annoyances which so frequently attack the downhearted and downcast. Nevertheless, when all is said and done, that person is a rare curiosity who can for many years escape falling a victim to some cold of more or less severity.

II. Exciting Causes of Colds.

1. *Skin-chilling or draughts.* The ordinary healthy individual with a vigorous, active skin, good digestion, and nervous strength, is able indefinitely to withstand any ordinary draught. People with good blood and healthy blood vessels will not catch cold because the wind blows momentarily on the back of their necks or on any other part of the body.

Those who catch cold from slight draughts are in a precarious condition. Instability of the circulation, and a state of lowered vital resistance, makes them an easy prey to any and every disease germ that may happen along. Victims of the draught bugaboo should begin at once a course of skin-gymnastics, by means of exercise and baths, and thus improve their skin-reaction to that point where they will be able to withstand all ordinary draughts.

Nevertheless, while we recommend these skin-gymnastics for persons with poor circulation and lowered vitality, we would not advise anyone to engage in foolhardy efforts to harden themselves or otherwise to expose themselves unduly to chilling influences. It requires time to make these circulatory changes.

As the skin temperature is over 90° F. and the air temperature is 70° F. or lower, much heat is given off by the body. The air next the skin is the warmest in the room and when currents move this aerial envelope away and replace it with cooler air, the skin may be cooled. Currents of cold air are more cooling than still air, but low temperature air may chill

whether still or moving. What we call the "feel of drafts" is the feel of low temperature.

2. *Damp or cold feet.* Wet feet is one of the great exciting causes of colds. Especially is this true in the case of young women. The nerves on the soles of the feet are reflexly connected with certain internal organs, among which are the mucous membrane of the nose, throat, and lungs.

Chilling the feet results in congesting the internal organs, while keeping the feet warm and full of blood, is a great aid in preventing and successfully treating colds. Of all parts of the body which should be kept warm continuously, the feet are the most important. That which is most dangerous is a combination of cold and moisture.

We have not yet improved on the advice of the old French doctor who exhorted us: "Keep the feet warm, the head cool, and the bowels open."

We greatly deprecate the recent tendency to *make light of wet feet, chilling draughts,* etc., as factors in the causation of colds. Some, in their effort to call attention to the important fact that colds are caused by germs, in their worthy enthusiasm to expose the "draught fetich," in their endeavors to lead people to quit coddling themselves, and in their laudable efforts to dispel the erroneous notions and harmful superstitions of the past, have gone too far; they have gone so far as to assert that wet feet and other exposure have nothing to do with catching cold.

3. *Superheated and contaminated air.* As a rule, it is not quickly going out into the cold air that causes one to take cold; it is rather the overheated indoor atmosphere with its poisonous gases that has so weakened both the skin and the air passages, that they are unable to produce a healthy reaction when suddenly exposed to cold—as in going from an overheated room immediately out of doors in very cold weather.

The temperature of living rooms during the winter should range from 65° F. to 68° F. If some of the members of the family are chilly at this temperature, let them put on wraps for a few days until they become used to it. When the room temperature is raised much above 70° F., an unconscious perspiration appears on the skin, the evaporation of which has a tendency to chill the body. This chilly sensation persists until the temperature of the room reaches the neighborhood of 80° F.; but if the temperature be maintained uni-

formly below 70° F., this unconscious perspiration is largely prevented and these consequent chilly sensations are entirely avoided.

4. *Unventilated sleeping and working rooms.* We are constantly meeting cases of recurrent colds and chronic catarrh which must in some measure be chargeable to the polluted air of the sleeping room. One should accustom himself to having all the bedroom windows wide open summer and most of the winter. There is no reason for closing the bedroom windows of healthy persons, except in very stormy or blustery weather; certainly not to exclude the cold air.

The working rooms must also be well ventilated if we are to escape frequent colds.

5. *Infected teeth.* If we take X-ray pictures of devitalized teeth, at least those that have been crowned for a number of years, we find the vast majority of the roots infected. Most of the older fillings of root canals are also found to be defective, and present evidence of more or less infection. A great deal of the rheumatism that used to be charged up to either meat-eating or bad tonsils, we now discover to be due to infected teeth, and it should be remembered that serious infection may exist at the roots of the teeth without presenting the usually expected symptom of toothache. You can have rheumatism and other trouble from a bad tooth that has never ached.

Pyorrhea—that disease characterized by softening and loosening of the gums at the margins where they meet with the teeth—is a disease which may be more or less concerned with chronic mouth, throat, and nose infections, and thus indirectly associated with chronic catarrh or colds.

6. *The germs themselves.* After all that may be said respecting the predisposing and exciting causes of colds, it must be recognized that *microbes are usually the real exciting cause.* There are several tribes of germs concerned in the work of producing colds. The germ most to be dreaded, of course, is the influenza microbe, which sometimes sweeps over the land as an epidemic wave. This germ not only produces local inflammation in the head or lungs, but floods the body with poisons which profoundly affect the heart and the nervous system.

The lumbermen who work out of doors in the northern woods are seldom bothered with our common colds, unless some visitor with a cold chances to stray into the camp. Some

colds of the influenzoid type are so virulent that they attack the average man on sight; they do not wait for the production of a favorable soil as a result of exposure. On the other hand, these outdoor laborers of the northern forests not infrequently subject themselves to extraordinary and unusual exposure, and never suffer in the slightest degree from colds. Such exposure would be promptly followed by a bad cold in the head if the cold-germ were present.

And so our study of colds goes more and more to show that two factors are concerned in the production of all ordinary colds; the *seed*, or the microbes; and the *soil*, or the state of the health, resulting from the predisposing influences to which the individual has been subjected.

III. The Prevention of Colds.

We have considered the causes of colds, both remote and immediate; and it will now be in order to discuss the *prevention of colds.*

1. *The care of the nose.* Thousands of people are victims of chronic or recurring colds because the nose is diseased. It may have a crooked septum, so that one nostril is almost obliterated. The turbinate bones may be enlarged, or polypi may be growing in the nostrils. Individuals suffering from any one or a number of these abnormal conditions are doomed to suffer from frequent colds, if they are not already victims of an annoying chronic nasal catarrh.

Colds commonly begin in the nose. In the case of mouth-breathers, or those who suffer from a more or less chronic tonsilitis, colds frequently begin in the throat. Any abnormal or diseased conditions in the nose, especially in the case of young people and certain weakly and debilitated persons, are sure to prove a constant source of colds in the head, or sore throat.

2. *The mouth and throat.* All persons with a weakened constitution, all who are predisposed to catching cold, should exercise special care to keep the mouth clean and free from bacteria. Cinnamon water, such as any druggist will be able to supply, will serve as an efficient mouth wash.

Many are troubled with chronic colds and catarrh, because they have *adenoids* growing in the roof of the throat. This is particularly true of children. These soft and abnormal growths are constantly dropping their secretions down into

the throat, producing almost incessant hawking and spitting on the part of their victims. Adenoids, whether found in children or adults, must be removed before we can hope to overcome the tendency to sore throat and frequent colds.

The throat must next receive attention. If there is chronic pharyngitis (sore throat), it should be treated before the approach of cold weather. If the tonsils are diseased, they should be treated and, if possible, restored to a healthy state. If the patient has suffered from repeated and severe attacks of tonsilitis; if the tonsils are so diseased that they are useless to the body, they should be promptly removed. Such incurable tonsils serve as the cause of constant colds, sore throat, and tonsilitis.

3. *Ventilation and humidity.* If you would avoid colds, breathe fresh air; ventilate the work rooms, the living rooms, and the sleeping rooms. Dryness of the air tempts to overheating of the living rooms, for dry air increases the evaporation of perspiration from the skin, thereby increasing the sensation of chilliness. Dry air at 75° F. will feel about as chilly as moist air at 65° F.

Stoves, coils, and furnaces should always have open vessels of water exposed to evaporation for the purpose of properly moistening the air. This moistening of the air will prove a saving of doctors' bills if not coal bills.

In the effort to prevent colds, carefully avoid public buildings, theatres, and churches, which are not properly ventilated. The "air of aristocracy" in the palace, and the "odor of sanctity" in the church, are both due to polluted atmosphere—lack of adequate ventilation; and they testify to the likely presence of a prolific crop of cold and other disease germs.

4. *The prophylactic throat gargle.* Dryness of the nose or throat often constitutes the first warning of an approaching cold. The secretions of the nose and throat are naturally germicidal and tend to destroy and wash out all mischievous germs and their toxins. But when, from any cause, the natural secretions of nose and throat are altered or suppressed, the various germs capable of setting up irritation, and which constantly find access to the nose and throat through the air we breathe, are able to find lodgment on the dry mucous membranes and begin their pernicious activities.

At the very first notice of dryness in nose or throat, the patient should freely gargle some warm antiseptic solution. In

many cases a warm salt solution will be sufficient to relieve the dryness and abort the infection. Lukewarm water having a teaspoonful of salt to the pint will serve very well. Another good solution for this purpose, which can be supplied by any druggist, is Dobell's Solution.

Dobell's Solution

Sodium borate	1 dram
Sodium bicarbonate	1 dram
Phenol (carbolic acid)	30 grains
Glycerin	1 ounce
Distilled water	2 pints

Mix and label: Use as mouth wash, nasal douche, and throat gargle.

5. *The daily cold bath.* Of all practices calculated to prevent colds, daily cold bathing is undoubtedly the best. Subjecting the skin to repeated applications of cold water constitutes a course of *vascular gymnastics* and greatly promotes the circulation of the blood through the skin. In this way the skin is prepared to withstand sudden draughts and other chilling influences from unavoidable exposure to cold.

It is best to take these cold baths immediately upon rising, by means of the wet hand or a wet towel. While it is more healthful to sleep in a cold bedroom, it is desirable that these cold baths should be taken in a warm room. The ideal plan would be, while sleeping in a cold, well-ventilated bed chamber, to have the bathroom warm, and immediately on arising, repair to the warm bathroom for taking the cold bath.

Vigorous persons, especially those who are accustomed to cold baths, will enjoy and be greatly benefited by a cold plunge in the bath tub filled with water; and for those who desire to carry this skin training to its full limit, we would recommend *salt glows.*

Cold baths, however, are not going to prevent colds if other important and predisposing causes are not corrected.

6. *Balancing the circulation.* All victims of chronic colds should see to it that the skin is kept warm both day and night. The ankles and feet should be properly clothed. Under no circumstances should the extremities be allowed to go cold. Until the circulation can be improved, cold feet should be treated by means of the alternating hot and cold foot bath. Get two basins of water, one as hot as can be borne by the feet, the other as cold as you can get. Put the feet first in the

hot water, then in the cold, leaving them about two minutes in the hot and about thirty seconds in the cold. Make the changes fifteen or twenty times and then after leaving them for one or two minutes in the cold water, thoroughly rub and dry them.

7. *Daily physical exercise.* Daily exercise in the open air is a part of the price which must be paid for a constitution strong enough to exist above the *chronic cold line.* Nothing else will take the place of exercise in the fight against colds. Muscular exercise not only improves the circulation, it also aids the digestion. Just as the sedentary life must be reckoned as one of the causes of colds, physical exercise, sunshine, and pure air, play an important rôle in their prevention and treatment. Physical exercise promotes the activity of the sweat glands and very generally aids the process of eliminating numerous poisons by thus encouraging the natural functions of the skin.

No exercise can be superior to brisk walking in the open air, with the head erect, chest forward, abdomen tense, arms swinging—in fact, every muscle in the whole body thoroughly energized. All forms of outdoor exercise will be found beneficial, whether it be horseback riding, useful employment, tennis, or skating, provided such exercises are not carried to injurious extremes.

8. *Hygiene of the bowels.* It seems highly probable that in chronic constipation certain poisons are absorbed from the bowel tract, and circulate through the body, irritating the mucous membranes of the nose, throat, and lungs, and predisposing the victim to colds, catarrh, sore throat, bronchitis, and even asthma.

It has long been known that clergyman's sore throat was largely caused by sour stomach and indigestion. It would seem that these bowel poisons further favor the taking of colds, by their irritating effect upon the small blood vessels of the skin, causing them spasmodically to contract, driving the blood from the surface of the body, into the internal organs, thus causing the skin to be especially subject to the action of draughts and other chilling influences.

The victims of chronic colds, in the vast majority of cases, are found to be suffering from *pale skin.* They are usually anemic in appearance. Their pale skins and their colds are often due to one and the same cause, that is, autointoxication

or chronic self-poisoning, resulting from indigestion and constipation.

9. *Vaccines.* I am convinced that various combined catarrhal vaccines—those containing the vaccines for the strains of common bacteria found in the nose and in association with common colds—are of considerable value in preventing common colds. Though we must frankly confess that they do not always succeed; that when the exposure is overwhelming and when the immunity is exceptionally low grade, colds come in spite of the vaccines, but even then they seem to be less severe and the vaccine serves in some measure to abort the attack, even when it fails wholly to prevent it. These vaccines are of value in treatment only when administered in the early hours of the attack. We look forward to the day when we may understand more concerning the cause of colds, and may be in position, therefore, better to perfect this vaccine treatment. In the meantime we can only expect partial results from this form of treatment, as we at present understand and administer it.

10. *Nasal inhalations and ointments.* Simple pocket inhaling tubes containing menthol, camphor, oil of eucalyptol, thymol, and pine oil mendicaments can be obtained. They are supposed to aid in aborting colds, and it is quite possible that sometimes they do. The following nasal ointment is a suggestion for such a purpose:

Menthol	25 grains
Camphor	25 grains
Eucalyptol	25 grains
White vaseline	4 drams

Mix, put into a collapsible tube, and use when the nostrils are abnormally dry or irritated.

11. The regular taking of *calcium phosphate* will serve to prevent many of the colds belonging to the pseudo-hay-fever type, as already noted.

IV. Treatment Suggestions.

While it is out of the question to undertake a full discussion of the treatment of colds in a book devoted to prevention, it may be permissible to suggest a brief summary of modern methods in the treatment of colds.

1. *General management.* The first step to be taken when coming down with a cold is to promptly empty the bowels. It is well not only to employ a cathartic for this purpose, but

also to wash out the lower bowel with copious enemas. The next step is to get warm, to bring the blood to the skin. The one important thing in the treatment of colds is to *keep the patient warm*. The drinking of an abundance of hot liquids and sweating is also helpful if the patient is not allowed to chill following the sweating procedure.

The diet should be light, preferably liquid or soft for the first day or two. Dietetic restrictions depend much on whether or not fever is present with the attack. Fruit juices and lemonade are always permissible.

Remember that persons with a cold need fresh air and it is beneficial even when it is cool, but also remember that it is imperative to keep the skin warm. *We must prevent chilling.*

Exercise is valuable in the case of robust persons when first coming down with a cold provided they have no fever. It is not advisable to undertake to break up a cold by heroic measures if fever is present.

Vaccines are beneficial in fighting colds only if given in the very early hours of the attack, and we should always remember that drugs such as aspirin, while they serve to relieve many of the distressing symptoms accompanying a cold, are not curative in their influence. It is a great mistake for patients to form the habit of drugging themselves with aspirin every time they think they are coming down with a cold, and this is also true of quinin, whisky, and other drugs which are used under the mistaken notion that they are cold cures.

2. *Treatment of the first stage.* When a cold first comes on, the throat and nostrils are dry. At this stage an oily spray used in a common hand atomizer would be of great help in aborting the attack. The following solution is very useful for this purpose:

Oil of eucalyptus	20 drops
Menthol	10 grains
Liquid paraffin	3 ounces

During this dry stage, vibration to the nose and massage is also helpful, and a prophylactic throat gargle, such as Dobell's solution (already mentioned) may be used. It is during this stage that hot towels to the face are also helpful.

3. *Treatment of the second stage.* The dry stage of a cold may last anywhere from one to twelve hours. It is soon followed by the moist stage. There is a great increase of secretion on the part of the nasal mucous membrane, and during

this stage while the general methods employed in the first stage are useful, it will often be found helpful to employ the general hot bath with a brisk cold finish, thorough rubbing, with the patient going immediately to bed. Care must be taken to see that there is no chilling as the result of prespiration which always follows a very hot bath.

The diet should continue light, and liquids should be given in abundance and the patient should rest in bed. Don't forget the danger of going about with a cold or the "flu" when you have fever. Go to bed and stay there until the temperature has been normal for at least 48 hours.

The eucalyptus spray in the nose can be continued, and if the throat is sore, the gargle can be kept up, though the latter probably is of little value after the cold is once thoroughly established.

The use of the electric light to the throat and chest, if there is a tendency to bronchitis, is probably of considerable value.

Let us not forget that when a cold is once thoroughly established it will run its course, just like measles or mumps. The late Dr. Osler—when he had been discussing in his clinic a case of common cold, and when asked what he was going to give the patient—is reported to have reflected a moment, and replied, "About ten days."

CHAPTER IX

INFLUENZA—LA GRIPPE

While common colds are undoubtedly frequently caused by microbes, nevertheless, influenza, as an epidemic disease, must always stand out separate and apart from colds. It is by far a more serious illness than the common household cold.

Influenza is an acute infectious disease accompanied by more or less fever. It spreads with extraordinary rapidity from town to town, and from continent to continent, and is notorious in that it indiscriminately attacks such a large percentage of the population. It is a disease manifesting itself largely by inflammation of the respiratory mucous membranes, great and sudden physical prostration, and not infrequently by complications and inflammations in various internal organs and other parts of the body.

FORMS OF INFLUENZA

Three distinct forms of influenza are now generally recognized. They are:

1. *Epidemic influenza.* As medical men anticipated and had roughly predicted, a world epidemic of the influenza struck us during the winter of 1918-1919. It comes regularly about every thirty years. While we have sporadic attacks of influenza between epidemics, the immunity that follows a world-wide epidemic is usually sufficient to protect one generation against another such outbreak. That is, after it thus sweeps over the world, those who are alive have acquired more or less immunity. Those who were highly susceptible are, in most cases, dead.

Then we have the ordinary grippe, influenza, catarrhal fever, common colds, etc., with us for another period of thirty years, until we grow up another non-immune generation. Then the stage is set, some autumn as soon as the inclement weather arrives, for an epidemic to spread over the world, governed in its range only by the extent and the rate of human travel.

The last epidemic was characterized by an unusual feature,

a peculiar and tremendously fatal form of pneumonia. The patients simply filled up with serum in the lungs and were thus literally drowned in their own secretions. It seems the more hardy the patients the more certain they were to perish. The vast majority between the ages of twenty and forty, who had this double pneumonia, died. The younger and the older seemed to fare better; but in my experience, in the latter part of the epidemic, after we resorted to enormous doses of atropin, many of these pneumonia cases were saved. But we are not likely to see, in the next twenty-five years or more, another such recurrence of influenza—another such world-plague.

2. *Endemic-epidemic influenza.* This is the form of the disease appearing for several years following the great world epidemics, and is a genuine influenza, although, as a rule, it is not quite so severe, and is not followed with such a large percentage of fatalities.

3. *Endemic influenza, or so-called catarrhal fever.* This is the milder form of the disease—not nearly so severe as the preceeding forms. It represents the disease which, when it is too severe to pass for a common cold, is usually described under the terms of "the grippe," "flu," etc.

THE INFLUENZA MICROBE

It is really difficult to say just what influenza is at the present time. The Pfeiffer bacillus which was formerly thought to be the cause of influenza was seldom found in connection with the last epidemic. As a rule, in cases of "flu" we only find the same germs in the nose and throat that we find in common colds. Recently the Rockefeller Institute announced the finding of a new germ (pneumosintes) in influenza patients—an organism which passes through an earthen ware filter—and a germ that seems to produce influenza symptoms when injected into animals.

If this new microbe proves to be the real cause of influenza, we may hope for the development of a real, preventive and curative serum. At present we are dependent on a vaccine made from a group of microbes—the group usually found in colds and catarrhal fever, and it is not very helpful in the management of the "flu." In general, these "bugs" are merely "secondary invaders"—germs which follow in the wake of the influenza microbe, producing pneumonia, etc.

Whatever the identity of the "flu" microbe, one thing is certain—he is there, and we should make every effort to isolate influenza patients; and those who nurse this disease, especially in time of epidemics, should wear washable gowns and gauze masks over the nose and mouth, which should be frequently changed, and they should wash their hands every time the patient or anything in the sick room is handled, and they should especially wash both hands and face on leaving the sick room. Bedding, eating utensils, and everything should be thoroughly boiled, or otherwise disinfected if they have been in the room of an influenza patient.

Influenza seems to confer life-long immunity on most people, at least, the average person only has one genuine attack during a lifetime. That is what limits the disease and its ravages to about one escapade for each generation.

THE SYMPTOMS OF INFLUENZA

As a general rule, influenza proves to be an inflammatory disease of the nose, throat and lungs; but not infrequently the poisons of these germs seem to localize in other parts of the body, giving rise to an entirely different type of the disease. As the respiratory type of the disease is by far the more common, we will give more attention to that form.

Influenza usually makes its appearance about three or four days after one is exposed to the germs. As a rule, the first symptom is a sudden chill, accompanied by profound physical weakness—prostration. In the typical cases, where the nose, throat and lungs are chiefly affected, there appears a profuse watery discharge from the nose. Severe pain soon appears just back of the eyes. There is also great pain in the back and in the legs; the pain is sometimes described as being in the bones; the patient literally aches all over. The fever is usually quite high, and the patient sometimes complains of intense general soreness.

The lungs are more or less affected, the patient begins to cough, and the sputum which is coughed up is of a characteristic greenish-yellow color and more or less lumpy. *La grippe* frequently runs into pneumonia, and these influenza pneumonias are exceedingly fatal.

The nervous symptoms of influenza, in addition to the pain already described and the profound and extraordinary prostration, may extend to the point of producing delirium;

and in one form of the disease there may result an actual meningitis.

In rare cases, the poisons of the germs seem more to affect the bowels; in which cases there are nausea, vomiting, colic, diarrhea, or even jaundice.

Influenza is the great disease of dangerous complications. While it spares most of its victims, and they apparently fully recover, it accomplishes its deadly work by weakening the system, undermining the vitality, and permanently crippling one or more of the internal organs.

Some victims of the grippe never fully recover the health of the lungs. They linger on for years with more or less of a chronic bronchitis, and eventually develop tuberculosis. In others the heart seems to be permanently affected. They live for years with weak hearts, and finally die of heart failure. Thousands die annually of influenza-pneumonia, pleurisy, etc. In other cases the disease is followed by severe diseases of the eyes and ears, while a not uncommon complication is nephritis or inflammation of the kidneys.

Since influenza is such a common cause of crippling the kidneys, every person who is afflicted with this disease, even in its lighter forms, should unfailingly have the urine examined once or twice following the attack, to make sure that the kidneys have fully recovered from the effects of the irritating toxins of this disorder.

THE RECOGNITION OF INFLUENZA

Bad as are our common colds, and their consequences when neglected, influenza is by far worse. Under no circumstances should the layman ever assume the grave responsibility of treating influenza. The best of medical assistance should be secured to help in combating this dangerous and treacherous disease. While we recognize that the average reader will probably not call a physician when but slightly suffering from an ordinary cold, we want to insist upon the necessity of calling medical help when smitten with influenza or the grippe, and to that end, we have prepared the following table, a parallel arrangement of the symptoms of a common cold and those of influenza, that one may be able to tell at once, and at a glance, the difference between the two ailments and thus be able to form a fairly accurate opinion as to the nature of his disease.

SYMPTOMS OF INFLUENZA

1. *Onset:* Sudden — without warning or previous hint. Strikes as by an unseen hand.
2. *Chills and fever:* Definite chills and marked fever. More or less sudden appearance of both.
3. *Prostration:* Profound, sudden, and continued, out of all proportion to the other symptoms.
4. *Coryza:* Watery discharge begins at once, little or no recognizable dry stage preceding its appearance.
5. *Sore throat:* Not such a constant symptom, unless complicated by tonsilitis. General soreness; diffuse redness.
6. *Headache:* Usually severe, often in the eyes or at the back of the head; hard to control; often described as a "splitting headache."
7. *Backache:* Nearly always present — severe — characteristic.
8. *Pain in the legs:* Usually marked and severe.
9. *Pain in the bones:* A characteristic pain of influenza.
10. *Temperature:* Fever runs high for several days—from 100° up to 105° or even 106°, in severe cases.
11. *Sputum:* Usually a characteristic greenish-yellow, containing many coin-like lumps.
12. *Lung complications:* Lungs usually involved. Severe complications often make early appearance.
13. *Nervous symptoms:* Very marked. In some forms resembling meningitis. Patient usually restless and sleepless. In severe cases, delirium.

SYMPTOMS OF A COMMON COLD

1. *Onset:* Not so sudden; usually passes through a warning stage.
2. *Chills and fever:* Chilliness rather than definite chills; fever not so marked or absent —so-called inward fever.
3. *Prostration:* Not so profound —merely a general weakness, just a general "good-for-nothing feeling."
4. *Coryza:* Comes on gradually, preceded by a dry stage lasting from a few hours to several days.
5. *Sore throat:* Usually an early symptom, especially when tonsils are diseased. May begin with slight tonsilar soreness.
6. *Headache:* Not so profound; eyes not so affected; usually in forehead or more to back of the nose; not always present. May be general.
7. *Backache:* Not usually present—only a feeling of weakness in the back.
8. *Pain in the legs:* Not usually present.
9. *Pain in the bones:* The bones do not especially ache in colds.
10. *Temperature:* Fever absent or runs low; usually comes on more gradually and runs from 99° to 101°.
11. *Sputum:* Not characteristic; may vary in color and form—yellow, white, or mixed.
12. *Lung complications:* Lungs often not involved. Lung complications appear later—the third stage of a cold.
13. *Nervous symptoms:* Not prominent as a rule; not profound. Patient often rests and sleeps well, if nose is not completely stopped up.

SYMPTOMS OF INFLUENZA—*Continued*

14. *Influenza:* Travels more in epidemics, although it is ever present with us. It runs through a town or a nation.
15. *Sequelae:* Leaves its victims prostrate. Is followed by lung, kidney, heart, and nervous diseases. Results of a single attack may be life-long. Patient remains greatly weakened for two or three weeks.

SYMPTOMS OF A COMMON COLD—*Continued*

14. *Colds:* May be contracted at any time; they are more local, although they may run through a family or a school.
15. *Sequelae:* Recovery from a single attack is more or less complete. More largely affects the nose, throat, lungs, and the sinuses. Repeated attacks usually required to produce serious after results.

PREVENTION OF "FLU" COMPLICATIONS

It is popularly supposed that there is very little to be done for the grippe; one must just go to bed and suffer; stick it out, and let the disease run its course of a week or ten days. This is a great mistake. Not only can much be done to shorten the course of the disease and to render the patient more comfortable, but such treatment will also greatly assist in preventing subsequent inflammations and undesirable after-effects.

1. *General treatment.* Put the patient to bed and keep him there until the doctor authorizes him to get up; that is, until the disease is thoroughly eradicated. Stop all solid food, give only fruit juices and gruels for two or three days. Give plenty of water or lemonade, either hot or cold; a glass of liquid every one or two hours when the patient is awake, and oftener if he desires it.

At the onset of the disease, it is well to give a brisk cathartic such as a dose of castor oil, followed in one or two hours by a dose of epsom salts. The bowels should be promptly and thoroughly washed out, by means of several large, warm, soapsuds enemas.

Sweating baths and hot foot baths in connection with hot lemonade drinking are valuable.

Do not forget to isolate and quarantine influenza patients. All discharges from the nose, throat and lungs, should be carefully collected and burned.

Keep the feet warm and the head cool; hot water bottles to the feet; cold cloths on the head.

2. *High fever.* The fever of the grippe is best treated by

cooling wet-sheet packs, or by injections of cold water into the bowel.

3. *Severe headaches.* When ordinary, generous cold compresses about the head, face and neck, do not control headache, it will be found best to give alternate hot and cold compresses to the head and face. Fomentations to the face, especially over the eyes, are often helpful. Protect the eyes with pledgets of cotton or by smaller cold cloths.

4. *The use of drugs.* Very little medicine is given by most physicians in influenza. Where it is possible to secure a physician, this matter as well as other phases of treatment should be left entirely in his hands.

In severe attacks of the grippe accompanied by unusual headache and great pain, remember that considerable relief is usually obtained by the use of aspirin, given in five-grain doses, every five hours for the first two or three days. It is not advisable to keep up the use of this medicine longer in ordinary cases. The objection to aspirin is that it causes sweating and predisposes, therefore, to chilling. We should also remember that aspirin is irritating to the kidney and depressing to the heart.

5. *Convalescence.* Too much emphasis cannot be laid upon the necessity of staying in bed with the grippe until one is entirely well. Do not make the serious mistake of getting up too soon. Time and money will be saved by taking two or three weeks, if necessary, to get well. Don't go back to work, or about your duties, until you feel quite strong. It is a fatal mistake to undertake one's regular work while one is still weak and wabbly from an attack of the grippe. Such presumption is likely to be rewarded later with attacks of nervous disorders, kidney troubles, and even heart difficulties.

CHAPTER X

TONSILITIS, ADENOIDS, AND OTHER DISORDERS OF THE NOSE AND THROAT

The larger tonsils are located on the sides of the throat, and as far as our present knowledge goes, are just about as useless as the small tonsil in the roof of the throat, which is primarily responsible for the development of adenoids. When healthy, the tonsils may serve as a barrier to the entrance of germs into the system from the throat; when the tonsils have once become diseased, when they have passed through several attacks of inflammation, they become more or less permanently enlarged, and if they ever possessed a useful function, it is entirely lost. Such diseased tonsils are hotbeds for the development of microbes, and are a great menace to the health of both children and adults, and no time should be lost in bringing about their complete removal. The size of the tonsil does not always indicate its degree of infection. Small, hard, buried tonsils are often the most seriously infected.

RESULTS OF NOSE, THROAT, AND MOUTH INFECTION

It may be well to summarize the numerous disorders that can come upon one as the result of neglected nose, throat, and mouth infections. Microbes which are lodged in these locations are able to spread infection through the lymphatic system, to produce enlarged lymph glands about the neck and jaw. They spread to remote parts of the body and start up inflammation in the joints—articular rheumatism. They lodge in the heart, setting up inflammation of the lining of that organ—endocarditis; and they become attached to the valves, where they result in producing leaks and obstruction—valvular heart disease. In the case of certain hereditarily predisposed children, they not only produce rheumatism—so-called growing pains—but they produce serious nervous disorders such as St. Vitus' dance, or chorea. In other cases, neuritis, neuralgia, and other nervous disturbances are produced, not to mention lumbago, backaches and headaches.

It is believed by some authorities that exophthalmic goiter is often produced by infection of this sort, as also is Hodgkin's disease, a serious disorder characterized by enlargement of the lymph glands in various parts of the body. Many surgeons believe that gall-bladder infections, ulcers of the stomach and bowel, and even chronic appendicitis are produced by nose, throat and teeth infections. It is interesting to know that fifteen per cent of diseased tonsils, when removed, are found to harbor tuberculosis germs. I am of the opinion also that many cases of erysipelas, which are otherwise difficult to account for, come as the result of these throat and mouth infections.

Results of neglected throat infections are also shown in ear troubles and deafness. Infection extends from the throat through a little tube back to the ear, and in this way permanent injury is done to the hearing.

Nose and throat infections also result in producing chronic mouth breathers.

Many cases of asthma are no doubt the result of poisons absorbed from diseased tonsils, teeth, and sinus infections.

Foul breath is also the result in many cases of these infections which are harbored in the nose, throat, and mouth.

Osteomyelitis is a painful infection of the bones which is sometimes mistaken for rheumatism. The onset is sudden and sometimes within a day or two a bone may be destroyed so as to necessitiate amputation. It is believed that even this severe disorder of the bone is due to infection which gains access to the blood through a sore throat and infected tonsils. In these cases perhaps a slight local injury, bruise, or blow over the bone may determine the site at which these dangerous microbes, which have entered the blood through some point of infection in nose, throat or mouth, will settle down to do their mischievous work.

DISEASED TONSILS

As the years pass, one by one the disorders that used to be known as constitutional diseases are found to be due to microbes and their toxins. Rheumatism, Bright's disease, heart disorders, etc., are now recognized as being produced by germs which gain entrance to the body through the tonsils, teeth, or some other organ which harbors chronic infection.

Fifteen or twenty forms of germs ordinarily live in the

human mouth; others are harbored in the tonsils, not to mention the microbes that may infest infected sinuses. Most enlarged tonsils are diseased. All tonsils that have been affected with quinsy are hopelessly infected and should be removed.

There can be little doubt that many cases of rheumatism, rheumatic fever, and even serious heart disease, in the case of young boys and girls, owe their origin to diseased tonsils. It is highly probable that the healthy adult tonsil would be but little larger than a lima bean; so it is evident that practically all cases of enlarged tonsils we see in children, youths and adults, are more or less diseased and permanently enlarged.

If the tonsil is sufficiently diseased to necessitate its removal, it is well to emphasize the importance of having it properly dissected out—enucleated. The older methods of tonsil-clipping, practiced one or two decades ago, are wholly unsatisfactory. If a tonsil is sufficiently diseased to necessitate its removal, it should be taken out in accordance with good surgical procedure—it should be enucleated—removed in its entirety, capsule and all. If small bits of diseased tonsilar tissue are left in the throat they are apt to set up trouble at some future time.

As a rule, we think it best not to remove tonsils until after a child is over four years old. The tonsils probably serve some valuable purpose in the first years of life.

The removal of infected tonsils does not always immediately cure heart trouble, rheumatism, etc. Sometimes there is immediate improvement on the removal of enlarged and diseased tonsils, the same as with infected teeth. At other times the infection has become so widespread throughout the body that the removal of the tonsils, even though they may have been the original site of infection, serves but little to stay the progress of the infection in the heart and joints.

In the case of infected tonsils and teeth, in order to help heart trouble and rheumatism, very much depends upon how early in the course of these disorders the original focus of infection is removed. If teeth and tonsils are neglected for months or years, it stands to reason that their removal will not serve to bring about an immediate cure, as the disease germs have spread and become well established in other parts of the body. Even in these neglected cases the removal of the original focus of infection is usually necessary as one of the steps that must be taken to bring about permanent relief.

On the other hand, we observe people going about for years with pus sacs at the roots of their dead teeth (or infected gums) and with enlarged and infected tonsils, and yet they do not acquire either rheumatism or heart disease. Much depends upon the nature of the organisms which are present in the teeth and tonsils and probably much more depends upon the inherent vital resistance of the individual. In many cases, no doubt, it is necessary that something should happen to lower the vital resistance in order that these low grade infections should spread and take root in new portions of the body.

X-ray, suction, and numerous other methods of treating diseased tonsils have proved helpful in certain cases, but none of these methods should take the place of surgery in the case of seriously infected tonsils.

WHAT ARE ADENOIDS?

It is entirely appropriate to study adenoids in connection with the tonsils and tonsilitis, for, in reality, adenoids are but a hypertrophy or enlargement of a certain small tonsilar body or lymph gland, known as the *pharyngeal tonsil.* This little body, for it is indeed quite small when not enlarged by disease, is located in the middle line on the roof or vault of the throat, directly behind the nostrils and just above the soft palate. It directly covers the opening of a minute canal which leads from the throat up to the region of the pituitary body at the base of the brain.

The purpose of this little tonsil in the roof of the throat is practically unknown to medical science. In fact, the function of even the larger tonsils in the throat still remains more or less of a physiological mystery; as all this tonsilar tissue can be taken out of the throat without producing the least discoverable effect on the health of the patient.

When this little pharyngeal tonsil is irritated or inflamed, its peculiar structure permits it to enlarge and extend until it may completely fill the vault of the throat, and so effectively stop up both nostrils as to render it impossible for any air to find its way through the nose to the lungs. This condition of affairs compels its victims to develop into mouth-breathers.

The very location of adenoids at once suggests great possibilities for mischief. They are in position to interfere seriously with breathing, and when their infectious secretions drop down into the throat, they are able to derange digestion

and disorder the bowels. They also occupy a position which enables them to affect the important special senses of smell, hearing and taste.

THE CAUSES OF ADENOIDS

Adenoids may make their appearance at any age. They are commonly observed in children from five to fourteen years of age, but in many instances they make their appearance in the first or second years of life; even children but a few months old have been found to have adenoids. Adenoids of sufficient severity to affect the health of the child are probably found in but a trifle more than five per cent of children, certainly not over ten per cent; while in the case of deaf mutes, it is found that over seventy per cent are afflicted with adenoids. This fact alone is a strong suggestion as to one of the potent causes of deafness.

It is highly probable that the pharyngeal tonsil may be first irritated and thus started on its career of mischief-making by the severe throat irritations and infections which almost invariably accompany the various diseases of childhood. The throat is usually severely inflamed in scarlet fever, measles, diphtheria, etc., and it is not unlikely that these diseases prove the starting point for adenoids; at least in many cases this is undoubtedly the real exciting cause of this troublesome disorder.

In other cases it is probable that adenoids make their appearance following several severe and persistent attacks of the "snuffles"—neglected colds; and so while adenoids often may be responsible for colds in the child of eight or ten years of age, it is highly probable that a succession of colds in the head earlier in life was directly responsible for the adenoids; and for this reason, if for no other, colds in babies and young children should never be neglected. Their colds should be antiseptically and intelligently treated, and not be allowed by neglect to set in operation inflammations of the nose and throat, which are almost sure to end in the production of a liberal crop of adenoids.

THE REMOVAL OF ADENOIDS

It is nothing more or less than criminal for parents and guardians knowingly to allow children to go along harboring these dangerous adenoids when a simple operation of but a

few moments' duration will result in their complete eradication. We are aware that even some physicians have taught that if adenoids were not very bad, they could be left alone and that they would dry up or go away at puberty. But this is now known to be a false doctrine. Adenoids are not especially prone to go away at puberty. They may persist indefinitely; besides, when they are allowed to remain for several years, they result in producing more or less permanent deformity of the face.

Again, the fact must not be overlooked that adenoids are responsible for by far the majority of earaches, as well as the majority of the colds which appear in children suffering from these diseased growths. It must not be forgotten that more than two-thirds of all children having adenoids, have their Eustachian tubes involved, and, as a consequence, the ears are more or less diseased.

When the tonsils are enlarged, adenoids are nearly always present; but it does not follow that when adenoids are present the tonsils are always enlarged. The tonsils are enlarged in only about one-third of the cases having adenoids.

The operation for the removal of adenoids is such a slight affair, especially in young children, that its performance should never be postponed for a single week when the presence of these growths is detected. When adenoids are suspected, the child should immediately be examined by a competent physician, that the facts may be ascertained.

There is no operation in modern surgery, not excepting its most skilful procedures, which can exhibit such a triumph in the line of immediate achievement and spectacular results as the simple operation for the removal of adenoids. Within a few short weeks following the operation, the child develops a good appetite, rapidly puts on flesh, takes a new interest in both work and play, sleeps well, exhibits marked increase in its powers of attention, becomes one of the brightest pupils in its class, the entire expression of the face changes —begins to beam with intelligence; the former listless child is now alert; the hearing, if it has not been permanently impaired, begins rapidly to recover; the fetid odor of the breath disappears; the digestive disturbances pass away; in fact, the transformation is so marvellous, so complete, and so sudden, that it proves conclusively that the poisonous excretions of the adenoid mass were being carried by the blood stream to every

cell of brain and body, and that, as a result, the entire being was so saturated and steeped with these toxins as effectually to retard all development. Upon the complete removal of these festering sores, the young life takes on a new lease, and begins to bud and blossom in a most astonishing and unexpected manner.

ENLARGED TURBINATES

The turbinates may be so enlarged in some cases as to necessitate the removal of a part of the turbinate itself, but in many cases it is found that this turgescence, or enlargement, may be suitably reduced, at least for many years, by the application of high-frequency electricity by the method known as "fulguration." Even if this process of reduction does not prove permanent, it proves very satisfactory for three or four years, and certainly affords great relief to the patient. It is a very simple procedure, done under local anesthetic, and requires only a few minutes at two or three sittings to complete the work.

Polypi. Many distressing nose and throat symptoms, symptoms of chronic colds, are produced by polypi—little growths which hang down from the roof of the upper nose and throat, sometimes completely obstructing the nostrils. Sometimes they are present in large numbers; the removal of those first seen, only serving to disclose numerous others on beyond. Patients are often afforded great relief from this simple operation, while on the other hand, they sometimes suffer through the greater part of a lifetime from failure to discover and remove these abnormal growths.

CHRONIC NASAL CATARRH

A fresh cold in the head may very properly be called an acute nasal catarrh. When these colds in the head follow one another in such rapid succession that a new cold appears on the scene before its victim has fully recovered from the preceding attack; when colds come so thick and fast that the individual is never without one; then we may look upon the condition as one of so-called *chronic nasal catarrh.*

The cause, then, of chronic catarrh is frequent and repeated attacks of acute catarrh—colds in the head. The treatment of chronic catarrh is simply the prevention and cure of common colds. Catarrh is not a disease—it is merely a symp-

tom of certain disorders and abnormalities in the nose and throat.

In the treatment of chronic nasal catarrh, every effort should be put forth to cultivate the general health and increase the vital resistance. Careful attention to the stomach and bowels, hot and cold baths for the promotion of the skin circulation, deep-breathing exercises, abundant water drinking, the outdoor life—plenty of fresh air and sunshine, together with proper physical exercise—are all concerned in the successful treatment and permanent cure of catarrh.

Of course, it is equally necessary that the nose and throat should be carefully examined, and that all abnormalities there found, be removed or corrected. Any method of treatment or mode of living that will enable one to rise above common colds will eventually effect his deliverance from chronic catarrh.

CHAPTER XI

HAY FEVER AND ASTHMA

Hay fever is a troublesome affection of the respiratory mucous membrane, due to the inhalation of the pollen from numerous plants, such as the ragweed. Hay fever may also be caused by inhalation of the odors arising from various animals. There really seems to be a true and false hay fever, the true hay fever being produced alone by the inhalation of pollen; while false hay fever may be produced by certain diseases and irritations of the nasal mucous membrane, as well as by certain food substances.

Other disorders of the respiratory apparatus frequently associated with hay fever, such as asthma, should always receive the attention of a competent physician. In fact, the majority of conditions treated in this volume demand medical attention; and this book has not been written with the thought of displacing the advice and counsel of the family physician, but rather to supplement it—to serve as a guide book to the patient in effectually and successfully carrying out the orders of his medical adviser, looking toward the prevention of disease.

HAY FEVER CAUSES

In addition to the predisposing causes of neurotic constitution and nasal disorders, the hay fever attack is excited by some specific irritant.

The onset of hay fever is very much like an acute cold in the head. The eyes are inflamed, sensitive to light, and tears run profusely. The nose is watery and red. There is usually headache, sneezing and coughing, often with a slight fever. Attacks of asthma may accompany hay fever and often follow it.

Early attacks of hay fever before the months of May are probably due to tree pollen, such as maple, birch, willow, or oak. During the months of April, May, and June, the irritat-

ing grass pollens cause hay fever, in addition to dandelion, daisy, oak, rose and maple and poplar tree pollens. During July, August and September, the hay fever attacks are usually excited by the pollen of ragweed, sage brush, golden rod, and numerous other autumn flowers.

In other cases, undoubtedly hay fever is caused by certain food substances, certain forms of protein. We know that hay fever, asthma, and certain skin diseases, such as urticaria, can be caused by both animal and vegetable proteins. Among the offending food substances may be mentioned white of egg, casein of milk, and the protein of wheat and other foods. Sometimes the protein of dandruff, those little scales from the human scalp or from the horse, can produce asthma or hay fever attacks when they are eaten, or when their emanations are inhaled.

When these peculiar reactions to protein substances are natural or inherited, they are known as *allergy*. When they are brought about artificially, as the result of an injection of diphtheria antitoxin or horse serum, then they are known as *anaphylaxis*.

The causes of hay fever and asthma may be summarized as follows:

1. The inhalation of odors, or emanations from the skin of animals, from dandruff, hair, fur, or feathers, whether they be derived from the horse, cat, cow, rabbit, fowl, guinea pig or goose.

2. Inhalation of pollen from various trees and plants; and in rare cases, even the inhalation of certain perfume odors.

3. The eating of certain food proteins, such as found in milk, eggs, fish, shell fish, wheat; and in some cases, certain drugs, such as aspirin or quinin will produce the attacks.

4. By the absorption of bacterial toxins, such as would be produced by germs found in teeth, tonsils, sinuses, gall-bladder, appendix, etc.

5. The injection of horse serum, diphtheria antitoxin, or tetanus antitoxin, may in certain predisposed individuals produce asthmatic or hay fever attacks, and for some time render the patient subject thereto, though more often such injections result in the appearance of hives or skin eruptions.

6. In rare cases, asthma and hay fever are found to be caused by certain forms of tooth paste, face power, and sachets, which contain orris root and rice powder, and when such

patients are tested for these substances they are found to give a positive reaction.

In case of asthma which develops after fifty years of age, the cause, as a rule, will be found in focal infections, bacterial toxins.

In connection with all of these investigations the patient should be subjected to a thoroughgoing general examination, including X-rays of the chest, blood pressure observation, urine analysis, blood tests, etc.

TESTING THE PATIENT

In general, if asthma and hay fever occur during certain seasons of the year, pollen would naturally be suspected as the exciting cause. On the other hand, if the disease appears throughout the year, and more especially in winter, food protein or calcium deficiency should be suspected, but in either case it is easy to determine the matter definitely by making a series of skin tests. At the present time, physicians are furnished with about 175 food proteins, almost 150 pollens, and almost a score of animal hair, dandruff, fur, and feather tests, as well as more than a dozen bacterial and miscellaneous perfume and drug tests.

We will not discuss the technique of making these tests as they will always be made by a physician, but in general they consist in making two or three scratches on the forearm, into one of which the test protein is rubbed, and the others are observed for control purposes. After leaving this test material on the scratch for half an hour, it is washed off. If the test is positive a little white raised lump about one-fifth of an inch in diameter will be seen. If the test is negative the skin remains unchanged, or just like the scratches made for comparison. These tests should not be made during and directly after attacks of hay fever or asthma.

When these tests are found to be positive, the patient may gradually be desensitized by the injection of increasing amounts of the offending substance into the body.

Many cases of hay fever and even such skin disorders as eczema can be cured by taking away feather pillows, or by substituting a cotton mattress for a hair mattress.

When hay fever and asthma are not shown to be due to any of the plant pollens, animal emanaticns, or food proteins, then focal infection such as abscessed teeth or pus at some other

point in the body should be suspected and searched for. Especially should the latter cause be suspected if there is present between these hay fever or asthmatic attacks, more or less of a chronic bronchitis.

PREVENTION OF HAY FEVER

One thing seems quite certain. Nearly all victims of hay fever are more or less *neurotic;* that is, the nervous system is more or less lowered in tone or otherwise weakened. In some highly nervous individuals, it may even be possible that the imagination plays a considerable part in many of their attacks of sneezing, and other hay fever manifestations.

All efforts directed toward the prevention of hay fever should make provision for the thoroughgoing treatment of the nervous system, improvement of the digestion, and the relief of any irritating or inflammatory disease of the nose and throat. Crooked nasal septums, polypi, enlarged turbinates, etc., should be thoroughly corrected before the approach of the hay fever season.

Find out the cause of your hay fever, and put forth intelligent and vigorous efforts for its removal. While most cases can be relieved or helped, in spite of all that can be done, some sufferers from this annoying malady are unable to gain relief except by a journey to some special climate, notably some of the Eastern mountains, or the shores of Lake Superior or Lake Huron. Cutting down the weeds about the premises will be of considerable help in the case of many persons. Staying away from the offending animal will help in other cases.

Sometimes, by the use of some simple smelling salts, hay fever attacks may be aborted, or greatly lessened in severity. A useful smelling salts for this purpose is the following:

Carbolic acid	30 drops
Ammonium carbonate	1 ounce
Charcoal powder	1 ounce
Lavender oil	20 drops
Comp. tincture of benzoin	½ ounce

HAY FEVER VACCINES

The making of these specific tests has made it possible, in the examination of hay fever and asthma patients, to arrive more nearly at a correct diagnosis as to the exact forms of protein, pollen, or other irritating substances, which may be

regarded as specific causes of hay fever or asthmatic attacks. We are now able to test out the patient, not only to ascertain if the numerous pollens may be the cause of trouble, but also as regards such substances as goose feathers, horse dandruff, and the numerous forms of protein associated with different food substances.

While this work is more or less in the experimental stage, nevertheless our experience with it the last few years has been very satisfactory, and in the near future this method of diagnosis promises to give us more or less complete and satisfactory information in at least ninety per cent of these perplexing cases.

The great value of this improved method of diagnostication is that it furnishes us the clew for specific treatment. If we discover that a certain form of pollen, or a certain sort of protein, is the cause of an individual's hay fever or asthma, then we can immediately start in with our process of immunization. That is, we begin the procedure of administering very minute doses of this offending substance to the patient, at frequent intervals, all the while gradually increasing the dosage, until by and by the patient acquires more or less complete immunity or indifference to this substance.

While this method of treatment is proving more and more successful, we are compelled to confess failure in a certain percentage of cases, but it has given the best results, in recent years, of any method of relief heretofore devised, and to-day offers the greatest possible help to hay fever sufferers—outside of complete change of climate—while it offers the greatest help of any procedure yet devised when it comes to the treatment of certain classes of asthmatic sufferers.

Any nose and throat specialist, or other physician having experience with this sort of tests and in the administration of vaccine and serum treatment, will be found competent to carry a patient through this régimé, and to prescribe and administer the necessary treatment which may be indicated by the outcome of this series of tests. Though, as might be expected, those more experienced in dealing with these cases will probably secure a higher percentage of successes in carrying out this method of treatment.

We are just beginning to learn that sometimes it is necessary to repeat these courses of vaccine treatment after the lapse of two or three years. Whether or not experience in

years to come will enable us to perfect the vaccines so as to yield more permanent results remains to be seen.

IMPORTANT FACTS

It should be stated, in this connection, that ragweed vaccination is very unsatisfactory. This is due to the fact that in the case of ragweed pollen, much of the mischief is mechanical—due to the cutting effects of the pollen; it is not wholly chemical, as is the case with the other pollen; therefore, less help must be expected by vaccines when the cause is found to be ragweed.

To be successful the injections must be begun at least eight weeks before the hay fever generally begins in any particular patient, and a series of injections must be given. The dose to begin with must be very small and then gradually increased, the injections being given at intervals of a few days. From ten to fifteen injections are generally necessary. Such treatment has prevented some patients from having an attack on that particular year and sometimes the following year, but their susceptibility is likely to re-develop at least by the third year, and they then require another series of injections.

Attention should be called to the fact that many of these pseudo-hay fever cases, along with some forms of asthma, are due to *calcium deficiency,* and that they are promptly relieved by taking a small amount of some lime preparation—either calcium lactate or calcium phosphate. Sometimes the calcium is more efficacious if it is combined with thyroid or parathyroid extract.

Diathermy is of considerable help in treating hay fever. It is not a cure but is certainly a valuable remedy.

CHAPTER XII

BRONCHITIS AND PNEUMONIA

Bronchitis may be either acute or chronic and is nothing more or less than congestion of the lungs. Like pneumonia, it is a condition which is much more serious in both infants and the aged. It would seem that prolonged congestion of the lungs creates a soil in which numerous microbes flourish and it is their toxins that set up the irritation which leads to the almost incessant coughing and other disagreeable symptoms which accompany an attack of bronchitis.

Bronchitis is best prevented by avoiding all habits and practices which serve to debilitate the system, as well as to avoid undue exposure to dampness and cold. In fact, in a general way those methods about to be discussed which are helpful in the prevention of pneumonia, are also of value in avoiding bronchitis.

Chronic bronchitis with a hacking cough is sometimes a symptom of the early stages of tuberculosis. At least, in every case of bronchitis, if it persists for several weeks, have your lungs thoroughly examined, including X-ray pictures, and make sure that your bronchitis is not a symptom of some more serious underlying ailment.

Pleurisy. When inflammation or infection occurs in the pleural cavity—in that space between the lungs and the chest wall, which is lined with the pleura—we sometimes experience very sharp pain on deep breathing. Pleurisy should always lead us to make a thoroughgoing investigation, as in the majority of cases it represents some serious infection, most likely tubercular.

PNEUMONIA—A NATIONAL SCOURGE

While it is never advisable for the layman to undertake the treatment and management of a case of pneumonia, provided medical assistance is at hand, nevertheless, there is a certain amount of information regarding the nature, cause and pre-

vention of pneumonia, which it will be profitable for everyone to possess.

Outside of heart failure, pneumonia outranks all other diseases in the number of deaths which it causes. It is a fact that most people have pneumonia at least once during their life, while many persons have it more than once.

Men are more susceptible to pneumonia than women, but it is less likely to be fatal in their case; and it seems that country folks are less liable to have the disease than those who live in the city.

In a way, pneumonia is no respecter of age or position. It attacks alike the old and the young. In fact, it is at these very extremes of life that the mortality from the disease runs the highest. Pneumonia is not only a contagious disease, but is also largely a preventable disorder.

Pneumonia is one of the deadliest foes of the human race. It even excels tuberculosis as a cause of death during the winter months in many sections of the country. In the last generation, pneumonia was very largely known by the name of lung fever.

In the study of pneumonia, it is interesting to note that the disease is both more frequent and more fatal in the South than in the North, just the opposite of what would ordinarily be expected. Another singular thing about pneumonia is the fact that it attacks strong, robust and healthy individuals in the full vigor of middle life just about as often as it does the more weakly and less rugged type of individual, except in the case of the very young infant and the very old, in which case pneumonia shows a special tendency to attack and destroy. The explanation for this may be that the less robust individual exercises more care and takes greater precaution against careless conduct and undue exposure which might lead to pneumonia.

CAUSES OF PNEUMONIA

Other microbes besides the pneumonia germ (pneumococcus) are able to cause pneumonia. While it is popularly believed that this microbe goes down through the nose, throat and into the lungs, it is highly probable that in the majority of cases these germs get into the nose, find their way into the blood, and are carried in the blood stream directly to the lungs, where they start on their pernicious rampage.

We should remember that the pneumococcus can also cause inflammation of other organs besides the lungs. Many cases of rheumatism of the joints are caused by the pneumonia microbe.

It would appear that the mortality rate of pneumonia rises and falls with the barometer. The greatest death rate occurs during the periods of highest pressure, and vice versa. The death rate is still higher when, in connection with a high barometer, we have very low temperature.

Pneumonia is particularly fatal in obese people, and in heavy drinkers. There are many reasons why this is true, and the "bogy man" of pneumonia should be a sufficient reason to lead all persons to shun obesity on the one hand, and intemperance on the other.

Still further, when fat people get pneumonia it goes hard with them because the fat around the heart embarrasses the action of that organ and many times death in pneumonia is due to heart failure. When we have both obesity and alcoholism, pneumonia is almost sure to terminate fatally.

While pneumonia occasionally becomes an epidemic in some sections of the country, and while many different microbes are concerned in its cause, there are certain *predisposing causes* which it is worth while to note:

We know that fatigue, worry, weakness and debility, together with poverty and insanitary surroundings all predispose to pneumonia. Lack of ventilation, filthy air, is a direct cause of this disease.

While the wealthy people, due to indolence, overeating and a sedentary life, are more subject to pneumonia, they do not die in such large numbers because of the better hygienic conditions which prevail in homes of this class.

The inhalation of dust, dirt, and smoke, all predispose to the contraction of pneumonia.

As regards climate, weather, etc., we think it is largely a question of the effect of these prevailing conditions upon the general vital resistance. There is no question but that conditions which lead to chilling and exposure do serve to bring on attacks of pneumonia.

TYPES OF PNEUMONIA

It may be well to call attention to the fact that we have two general types of pneumonia, and briefly considered, they are:

1. *Bronchial pneumonia.* The onset of this form of pneumonia, which is far less fatal than the other type, is usually gradual. It is usually inaugurated with a cold, the "flu," measles, or some other form of infection. The patient, as a rule, starts in early to cough, has a high fever in the neighborhood of 104° F., the breathing is very rapid and difficult, ranging from 25 to 50 or more respirations a minute. Sometimes the lips are bluish, as also are the finger nails, and as a rule there is spitting up of streaks of bright red blood.

2. *Lobar pneumonia.* Lobar pneumonia is the far more fatal type and is the one that comes on suddenly, with a chill, high fever, rapid breathing, and a stabbing pain in the side. The expectoration in this case is usually more of a rusty color, jelly-like sputum. The pain is very constant and severe and the fever keeps up until the day the crisis is reached, when it drops to normal within a few hours, in contradistinction to bronchial pneumonia, in which case the fever gradually subsides over a period of several days.

HOW TO PREVENT PNEUMONIA

1. *Avoid infection.* Do everything in your power to avoid catching cold. That means to avoid persons who have colds, who are coughing and sneezing, and especially to stay away from large crowds, crowded street cars, and other places where large numbers of people are congregating and where the ventilation is inadequate. Stay away from other cases of pneumonia.

2. *Nasal toilet.* Keep the mouth, nose and throat clean and free from disease. In this way you will lessen the chance of taking pneumonia, for we must remember that in a certain sense, a person can catch pneumonia from himself. That is, we harbor these germs in some of the diseased or abnormal structures of the nose and throat and then, at the time of lessened resistance or other systemic disturbance, the germs get into the lungs, take root, and produce the disease.

3. *General hygiene.* Pay attention to the general health. This means that we must avoid overeating, attend properly to our elimination, and see that we have the necessary sleep, while we take care not to overwork and subject ourselves to unnecessary exposure. Shun obesity. Do not neglect a reasonable amount of physical exercise during the winter season.

4. *Avoid stimulants.* If we would avoid pneumonia, we

must avoid the use of stimulants. Undoubtedly the excessive use of alcohol, tobacco, and other narcotics predisposes to the contraction of this serious and offtimes fatal disease. Avoid taking whisky and quinin as a cold cure. Alcohol is one of the greatest known influences which not only predispose to pneumonia, but renders the likelihood of recovery far more uncertain.

5. *Shun crowds.* Keep out of crowds, especially during pneumonia epidemics, in the late months of the winter season. You can get pneumonia that will prove serious in your case from an entirely well person, from their sneezing or coughing, for many such well persons are "pneumonia carriers."

6. *Don't neglect colds.* Take good care of your own colds. It pays to watch a cold and use common sense. Foolhardy action during a cold, especially if it is accompanied by a fever, simply means that you are running an unnecessary and serious risk of contracting pneumonia. Especially look out for chilling when you are just recovering from a severe cold. There is real reason for believing that neglected colds often run into pneumonia.

7. *Breathe clean air.* Keep the air of the living, working, and sleeping rooms fresh, clean and cold. Avoid overheating and see that the humidity is kept up by the evaporation of a sufficient amount of water to prevent undue drying of the air.

8. *Infectious contact.* It should be remembered that pneumonia may be communicated from one person to another by means of eating utensils, handkerchiefs, contaminated bedding; in fact, anything that has been in contact with the patient may serve to communicate the disease to someone else.

9. *Isolation of patient.* Pneumonia patients should always be isolated in a sunny, airy room, and everything coming in contact with the patient, from dishes to bedding, should be boiled or otherwise sterilized. Sputum is best preserved on toilet paper and kept in a sack pinned to the side of the mattress, and when it is full, the whole sack should be burned, a new sack taking its place.

10. *The nurse* on a pneumonia case should wear a gown, and in the more severe epidemics, it would be well if she wore a gauze mask over her face. She should wash her hands frequently, at least every time after handling the patient or any of his effects.

11. *Overcrowding* especially predisposes to pneumonia out-

breaks, as was shown by crowding large numbers of men into the barracks during the war. It seems that if the germs responsible for the various types of pneumonia have a chance to pass rapidly from one person to another they increase in virulence.

12. *Promiscuous spitting,* careless sneezing and coughing, all help to spread pneumonia, as well as colds and influenza.

While this is not a work devoted to treatment, it may not be out of place to call attention to the fact that more recently pneumonias have been put into four different groups, and that we now have group serums which are very effective in certain types, particularly group 1. We may possibly be on the way to the successful solution of the baffling problem of finding a successful treatment for pneumonia.

PREVENTING PNEUMONIA IN THE "FLU"

The important thing, in the treatment of influenza, aside from serious complications, is the prevention of pneumonia, and this may be effectually combated as follows:

1. In every way possible, keep the blood circulating in the skin. Keep the patient warm. This does not necessarily mean that he must breathe polluted and overheated air. The patient can be surrounded by hot water bottles and properly covered, while plenty of fresh air is admitted to the sickroom.

2. Pay special attention to keeping the feet and legs warm. If necessary, put extra clothing on the lower extremities.

3. See that the lungs are kept properly covered, and that the shoulders are not exposed. If the patient tries to sit up in bed, later in the disease, see that warm shirts or jackets are put on.

4. Provide the patient with plenty of fresh air day and night. There is no virtue in ultra-cold air. In fact, too cold air only serves to irritate the lungs and produce distressing paroxysms of coughing.

The treatment of pneumonia should never be undertaken by the layman—unaided by medical counsel. Get the best possible help in the way of nurses and doctors for the pneumonia patient. The recently developed serums are very helpful in pneumonia—especially in certain types or groups.

CHAPTER XIII

THE PREVENTION OF TUBERCULOSIS

Tuberculosis is one of the most general and widespread of all diseases afflicting the human race; and while its treatment should always be under the supervision of a competent physician, and in the more advanced stages it is best treated by the sanitorium method; nevertheless, there are many features respecting its prevention and hygienic management which the layman in general, and the tuberculosis patient in particular, should clearly understand.

The more we know about tuberculosis, the better we can prevent the disease, the easier it will be for us to avoid contracting this so-called "great white plague"; and the more intelligent the patient becomes about his own affliction, the more successfully he will engage in the work of effecting its cure.

It is interesting to note that tuberculosis is widespread, even in Asia Minor, among the Bedouin Arabs, notwithstanding the fact that they live almost wholly in the open air. The fact that these out-of-door nomads are afflicted in such large numbers with tuberculosis is probably due to the fact that at least fifty per cent of their cattle are infected with tuberculosis, and since the Bedouins live almost wholly on milk, it is highly probable that they contract this disease from cattle.

Tuberculosis (consumption) of the lungs was a disease little understood until 1882, when Robert Koch announced the discovery of the microbe responsible for the causation of this disease. Ever since this time it has been regarded as an infection, one that is preventable and also one that is, if taken in the earlier stages, quite easily cured.

WHAT IS TUBERCULOSIS?

Tuberculosis is an infectious disease caused by a microbe—the tubercle bacillus—and under favorable conditions this germ may attack most any part of the human body, although

in the popular mind it is a disease most commonly associated with the lungs.

Contrary to a stubborn popular belief not yet entirely overcome, let us emphasize the fact that *tuberculosis is not an inherited disease,* though we do recognize that the tendency to succumb to this infection is inherited—and that this tendency runs in families, even in races. The daily sputum of a consumptive victim may contain millions of germs and the belief that the disease was inherited is due to the fact that tuberculosis in the father and mother very early infects the children.

Tuberculosis is one of the secret and insidious, not to say invisible, foes that slowly creeps upon its victim. It works slowly, each day still further and still more surely tightening its grip until the unfortunate sufferer finally weakens and wastes away.

The war of tuberculosis on mankind is more deadly than the wars of conflicting nations. Tuberculosis has caused far more widowhood and orphanhood than all the wars in which the United States has engaged, the World War included.

Tuberculosis is found in all countries, in all climates. It attacks all races, and afflicts all ages, and no organ or part of the human body is immune to its ravages. This world-wide plague is common in cattle, sheep and hogs. It also attacks chickens, fish, dogs, cats and is found in rodents—rats and mice.

Races that have not long been exposed to the disease are peculiarly subject to it and it is particularly fatal in their case. We refer to such races as the Negroes, Eskimos, and North American Indians.

TUBERCULOSIS—A MORTAL PLAGUE

The deaths from tuberculosis in the United States still run around 100,000 a year. That is, every five minutes some man, woman or child dies from its ravages—almost a dozen every hour; about 275 a day; and yet, on the whole, we should remember that tuberculosis is both a preventable and curable disease.

The most formidable obstacle in our campaign against tuberculosis is the tendency to neglect the disease in its earlier stages—the undiscovered cases—the person who has tuberculosis and doesn't know it. When this country entered the World War, the draft boards and the army doctors found

more than 100,000 unsuspected cases of tuberculosis among the young men who thought themselves physically fit for military service.

Of the more than 100,000,000 now living in this country, we know that between 7,000,000 and 8,000,000 of them are doomed to die of some form of tuberculosis unless the ravages of this plague are further checked. This is a loss of life, not to say treasure, that is truly appalling. This is why we are so encouraged by every little gain in our fight against this disease.

It is estimated that we have at the present time pretty close to 1,000,000 active cases of tuberculosis in this country, and this figure does not include an almost equal number of inactive cases.

In connection with a recent health investigation at Framingham, Mass., where a whole city put itself under the care of physicians, it was found there were 15 cases of tuberculosis for every death. This would indicate a total of over 1,500,000 cases, in the United States at present.

Most of the victims of tuberculosis are taken in the prime of their life. About one-fourth of all who die between the ages of 18 and 45 are killed by tuberculosis, and the economic loss to the nation from tuberculosis amounts to more than $1,000,000,000 each year.

Among the 100,000 persons who are killed by tuberculosis in the United States every year, there are almost 10,000 children under five years of age. Children are particularly susceptible to this infection. More than 50 per cent of all children are infected with tuberculosis before they are 10 years of age, and this percentage increases until at 15 years of age it reaches 60 to 70 per cent; while by the age of 21, practically everyone has been infected more or less by tuberculosis.

CAUSES OF TUBERCULOSIS

Let us reiterate that tuberculosis, as such, is not inherited by the child from its parents. The child born with tubercle bacilli derived from the mother, while it has occurred, is regarded as a medical curiosity. The thing that is inherited by the child from its parents is a low degree of resistance—a peculiar susceptibility to taking the disease. Even in the case of those who are predisposed to tuberculosis by heredity, they may be taught how to live above this disease and thus escape

its ravages. The power of nature to overcome and resist disease may be greatly strengthened or weakened by our methods of living.

The germs of tuberculosis are ubiquitous—they ride on the dust of the atmosphere as messengers of death on airships of destruction. They are found in the dust on floors, in the carpets, on the walls, in the dust particles blown from the street, in street cars, on railroad trains, anywhere and everywhere, except in mid-ocean and on high mountains; and this is why practically all of us are infected at some time in our life with this scourge, and the only reason we do not die of it, is the inherent vital resistance of the body which enables us to overcome this infection. Later in life we undoubtedly come to possess more or less of an immunity to the disease.

1. *Predisposing causes.* The predisposing causes of tuberculosis are bad hygienic practices in general and insanitary living and working conditions that have to do with impure air, dust, and dirt.

Any condition or conditions which serve to weaken one's physical resistance, whether it be overwork, undernourishment, alcoholism, dissipation, influenza, colds, pneumonia, measles, typhoid—in fact any disease that materially weakens the system, predisposes its victims to subsequent tuberculosis. Fifteen per cent of diseased tonsils, when removed, are found infected with tubercle bacilli.

Men who work where there is considerable dust are peculiarly susceptible to tuberculosis. The metallic dust of printing offices and brass works; the mineral dust of quarries and potteries; the vegetable fibre dust of textile factories and paper mills; and the animal and mixed fibre dust of carpet factories, are all predisposing causes—these small particles of dust injure the lungs and thus open the way for the germs of tuberculosis to find lodgment.

Bad hygienic methods of living, eating, drinking, overeating, lack of exercise, sedentary living, worry, loss of sleep, faulty ventilation, sexual excesses, in fact any practice that lowers vitality and diminishes one's vital resistance, serves as a predisposing cause for tuberculosis.

Common colds when neglected, bronchitis, pneumonia, measles, and whooping cough are particularly influential in bringing about a condition of the lungs which predisposes to tuberculosis.

Alcohol is one of the chief causes of rendering one susceptible not only to pneumonia, but to tuberculosis; and there is no excuse for ever resorting to the use of alcohol as a remedy for any form of tuberculosis.

2. *Immediate causes of tuberculosis.* The most direct and immediate causes of tuberculosis are: Milk from tuberculous animals; meat infected with tuberculosis; and still more especially, exposure of one's self to intimate contact with another human being who has this disease in an active stage. The immediate cause is the germ itself—the tubercle bacillus. On the average, about one cow in ten is infected with tuberculosis. Twenty-five per cent of tuberculosis in children comes from infected milk.

3. *Relation to other diseases.* It would seem that the victims of rheumatism and associated kidney trouble are not often afflicted with tuberculosis. On the other hand, diabetics are prone to contract consumption. A young person with diabetes stands about an even chance of having tuberculosis.

Except in the advanced stages of tuberculosis, pregnancy does not seem to be particularly harmful or fatal and many healthy children are born of tubercular mothers. In the advanced stages of the disease, pregnancy is a serious complication.

About nine out of ten adults are thought to be immune to tuberculosis—they have had it when young and recovered. In most cases, when adults come down with tuberculosis, it means the "flaring up" of an old and latent infection.

THINGS WORTH REMEMBERING

In our efforts at early recognition of tuberculosis, let us not overlook the significance of the following manifestations of this ailment.

1. A *chilly sensation sometimes* precedes the afternoon rise in temperature.

2. Sometimes the first symptom of early tuberculosis is persistent *hoarseness.*

3. *Low blood pressure* is one of the early symptoms of tuberculosis.

4. *Spitting blood* must not always be taken as a sign of tuberculosis and render one too apprehensive. Blood is frequently brought up in other disorders of the throat and lungs, particularly bronchitis.

5. The *fever* of consumption does not usually run very high, ranging from 100° to 102° F.; rarely does it go to 103° F.

6. *The cough* is usually worse at night and in the morning on arising. Medicine to stop the cough should not be taken. When it is dry, hacking, and unproductive, an effort should be made to control it by will power. Coughing is the only means the lungs have of keeping themselves clear from the accumulation of mucus.

7. *The temperature record.* If a person suspects he has an early case of tuberculosis it is a good plan to get a reliable thermometer and take the temperature five or six times a day for a week or two. It is a good plan to get the temperature at six, and nine in the morning, at noon, and at three, six, and nine P. M. Most cases of tuberculosis have a slight drop in temperature in the morning, running down to 98 or maybe a trifle lower; while in the afternoon, there will be a rise to a little over 99.

8. The *range of temperature* is not at all suggestive of the severity or the advanced stage of the disease, but this is a symptom that will appear, as a rule, months before coughing occurs and, of course, a still longer time before the tubercle bacilli can be found in the sputum. Especially should patients suspect these early symptoms of tuberculosis when they have been living in the same house with, or otherwise have been in close contact with, people who are known to have tuberculosis.

9. *Early symptoms.* The early symptoms of tuberculosis are: Loss of weight, energy, and ambition; ever-present tired feeling; stomach trouble, frequent colds and persistent hacking cough; pleurisy, or spitting up blood; pain in the back between the shoulders; hoarseness; afternoon fever, and night sweats.

SPITTING UP BLOOD

We must always distinguish between the raising of a small quantity of pure blood, one teaspoonful or more, and the raising of streaks of blood mixed with sputum. Blood-streaked sputum may be due to causes other than tuberculosis. We should remember that spitting up of blood is sometimes the first symptom of a beginning tuberculosis of the lungs. Sometimes a physical examination of the lungs at this time reveals little or nothing abnormal.

The causes of spitting up of blood, in the order of their frequency, are:

1. Tuberculosis of the lungs.
2. Mitral heart disease.
3. Abscess of the lungs.
4. Pneumonia.
5. Aneurysm.
6. Throat disorders.

PREVENTION OF TUBERCULOSIS

Optimism is a wonderful thing when it comes to the treatment of tuberculosis, but when it comes to its prevention, it is not always well to be so optimistic, so care-free and cheerful about the dangers of contagion. It would be wiser to exercise a little more forethought even if we do not indulge in fear-thought.

1. *The price of carelessness.* Consumptives need to be frank with themselves and about themselves—while avoiding pessimism, at the same time not to stumble into blind optimism. What we want is to know the facts, make up our mind what to do about it, and then, after exercising good judgment in the careful selection of the plans of battle, to persist in the struggle with determination and courage.

One thing is certain—there is little or no hope for a pessimistic consumptive. There is hope for those who have optimism and determination.

2. *Avoid infection.* The first step in the prevention of tuberculosis is to avoid exposure to the microbes. In this connection, infected patients must be taught not to expectorate on floors, sidewalks, etc. The tuberculosis patient going down the street, spitting right and left, is just as dangerous to have in the community as a maniac running amuck with a machine gun. Avoid overcrowding; forty-two per cent of tuberculosis in New York City was found in families who lived in one room.

3. *Food infection.* Milk and meat from questionable sources must be avoided. This is why physicians believe in pasteurizing milk. We know that tuberculosis can be got from cattle.

4. *Pure air.* We must remember to sleep in a well ventilated room, to avoid dust and other sources of irritation to

the lungs. Sleeping out of doors, that is, in reasonable weather, or what is just as well, to open wide the windows and have a properly ventilated room, is a great preventive of tuberculosis.

5. *Physical exercise.* Proper physical exercise and reasonable development of the chest are all helpful in preventing tuberculosis, especially if it shows a tendency to run in your family.

6. *Colds and pneumonia.* We must make sure to get over colds with reasonable promptness. We must look out for the after-effects of pneumonia, bronchitis, and particularly measles, in the case of children, and see that it is not followed by more serious lung complications.

7. *Diet.* The question of a nourishing dietary comes up in this connection. Tuberculosis seems to be a disease that attacks not only young people, that is, those under forty, but also those who are run down in general, particularly in weight. While being overweight and obese predisposes one to pneumonia after they are 40, being underweight, we should remember, predisposes us to tuberculosis before we are 40. The proper amount of fat should be present in the food of all persons under 35 to 40 years of age. This means cream, or butter, as well as the fat contained in foods such as pecan nuts, ripe olives, etc.

It is probably true that the vegetarians in the past, where they carried the diet to such an extreme as to eat no animal fat, predisposed themselves to tuberculosis.

8. *Isolation.* Isolate the tuberculosis patient. Burn the sputum. Disinfect the bed clothing and eating utensils by boiling. Fumigate or otherwise disinfect suspected rooms before living in them; health officers or visiting nurses will advise as to proper methods.

9. *In suspected cases*—call in a physician or go to a hospital or dispensary. Get a thoroughgoing examination, including an X-ray of the lungs. Have all suspected and enlarged lymph glands treated by X-ray and such other methods as may be indicated in individual cases.

HOW TO WIN THE BATTLE

The anti-tuberculosis societies—for whose benefit we buy the Xmas seals—have done much to crystalize the fight on the great white plague and to organize, stimulate and enlighten

public opinion, and have sent broadcast to the individual sufferer and the endangered members of his family much valuable instruction about using the "ounce of prevention" which is so much better than the best "cure" for any disease. The following practical suggestions are to be found among those furnished for the purpose of pointing out to the public how to prevent the spread of the tubercular plague.

1. By teaching the consumptive to destroy his sputum, so as not to infect his family or his neighbors. There is nothing truer than that spitting spreads disease, particularly tuberculosis.

2. By teaching all people not to sleep, live or work in dark or badly ventilated rooms. Sleeping porches are great promoters and preservers of health, but if they are beyond one's means one should at least keep the windows wide open at night.

3. By discovering the disease in its early stages and curing the patient, thus removing the source of infection to others. This is particularly the work of the organizations and individual physicians.

4. By educating the community as to the nature of the disease, that it is communicable, preventable, and curable.

5. By educating people to keep their bodies in such physical condition as to enable them to resist the germs of tuberculosis.

6. By advocating fresh air, outside life, sunshine, rest, no overstrain, whether at work or in exercise; wholesome food, and temperate habits.

7. By safeguarding the health of children, giving them clean places to play in, and taking special care to keep them away from sources of infection.

8. By providing institutions, nurses and dispensaries for the care, cure, and restoration to a safe and sane life of those who are afflicted with the disease.

9. By insisting on periodic physical examinations for every one, well or sick. These examinations should be taken at least once a year; every six months would be better.

10. Twenty years ago the death rate from tuberculosis in the United States was 200.7 in each 100,000 of population. That meant a death loss of 200,000 a year. It has now come down to 99.4 in each 100,000 of population—only one-half what it was two decades ago.

CHAPTER XIV

DISORDERS OF THE EYES AND DEFECTS OF VISION

Of the many diseases affecting the eyes, we can consider only the prevention of the more common ailments of this organ of special sense. In the case of the more severe diseases of the eye, it is at all times unwise for the layman to undertake their management without medical advice; however, we will give directions, and offer suggestions as to the best methods of prevention, as well as to present those facts that will enable the patient more intelligently to coöperate with the physician who may have the management of these more serious disorders in charge.

ERRORS IN VISION

1. *Far-sightedness* is a condition in which the eye is too short from front to back—it is too flat, thus subjecting the organ to strain when an attempt is made to focus an object. This compels certain little muscles of the eye to exert themselves in an effort to bring the lens forward to a point of focus, and if the defect is not too great the eye muscles can in this manner rectify the error. This strain of accommodation, however, if it is too much, never permits the eye muscles to rest, and soon leads to trouble, nervous and otherwise. Especially is this true if much near work is done, reading, sewing, etc.; in which case the eyes become misty and the head tends to ache. The true remedy is properly fitted glasses.

2. *Short-sightedness.* In contrast with far-sightedness, we have short-sightedness (myopia). This is a condition which sometimes tends to increase with children when the eyes thus afflicted are neglected. However, short-sightedness is not so much produced by early study on the part of a child; it is an hereditary tendency. Short-sightedness is an inherent characteristic of the German people. It is not therefore altogether

an acquirement of civilization, though, of course, hard study and excessive reading, when young, tend to aggravate this disorder. Among other influences which tend to accentuate short-sightedness the following may be mentioned:

1. Prolonged use of the eyes for near work—reading, writing, needlework, drawing, etc.

2. Night reading of books with small type as well as the study of poorly printed school books.

3. Too early employment of the eyes at fine needlework, or tedious near work of any description.

4. Imperfect lighting, artificial or natural, of school or workroom.

5. When books or work are held too close to the eyes, owing to the bad position at, or faulty arrangement of, the desk or table.

In every way possible see that the child is prevented from straining the eyes, and do not allow any work or books to be held nearer the eye than 12 inches. The child should work from a sloping desk and not a flat table. It is best that they should use white slates or paper—not black slates.

If this defect is suspected, the eyes should be early examined and fitted with corrective glasses.

3. *Astigmatism* is a condition of the eyes much more complicated than that of either near-sightedness or far-sightedness. In this condition some parts of an object are clearly focused while other parts are indistinct, more or less blurred. For instance, a person with marked astigmatism, when they look at the face in the back of the bowl of a spoon, if it is held vertically, the face seems longer, if held horizontally, it is wider. They also have difficulty sometimes in seeing a point clearly; it appears either blurred or drawn out in one direction. That is, the point sort of twinkles like the stars at night. It is very difficult for the muscles of the eye to overcome this inherent defect. It is this defect that causes children, and adults for that matter, to peer out of their eyelids, like an animal looking at the sun. That is, they screw up the eyelids, or slope the head, or look at an object obliquely.

Actions like this on the part of children should always arouse suspicion of astigmatism and it is very important that such children's eyes should be early examined and fitted properly with glasses. See that the eyes are examined by a competent physician who specializes in correcting defects of vision.

Do not allow some clerk in a drug store or other incompetent person to fit your child or yourself with spectacles.

4. *Old sight.* At about the age of forty or forty-five most of us wake up to the fact that our eyesight is not as good as it used to be. This is due to the onset of what is termed "old sight" (presbyopia), and it simply means that, owing to the natural failing of our normal vision, we are going to have to wear glasses.

Failing eyesight at this age is not a disease, but a physiological process of "aging" which every eye undergoes if it lives long enough. Such a failing of vision does not mean that there is danger of losing our sight altogether; it simply indicates that the power of focusing the eyes for near objects is being appreciably lost, gradually lessened—in fact, this thing has been going on for years—it has been taking place unconsciously since childhood. So long as we can readily focus our eyes for objects eight or ten inches away we are not aware that this change is going on, for we read with ease, but when the nearest point of clear vision gets a little farther off, then we awake to the fact that old sight is creeping upon us—that the days of our youth are over—that the time has come when we, too, "must take to glasses."

In this connection we must not overlook the fact that there are numerous diseases which carry failing of the eyesight as one of their cardinal symptoms. For instance, in the case of Bright's disease, if the patient goes blind we expect death in less than two years.

5. *Neurotic vision.* In the severe neuroses—neurasthenia, brain fag, hysteria, and psychasthenia—we often meet with disorders of vision which baffle the skill of the most experienced oculist. It seems to be an impossibility to fit their eyes with glasses satisfactorily. I have seen these neurotic sufferers with two dozen pairs of glasses—none of which gave satisfaction.

In order to help these nervous patients we must treat the underlying neurotic difficulty. From day to day there is such a variation in their eyesight that it is out of the question to supply glasses that will properly correct defective vision. They must be encouraged to use approximately correct glasses until such time as the general nervous tone is considerably improved and then it will be possible to supply them with proper and wholly satisfactory spectacles.

In hysteria we sometimes meet with functional blindness—these nervous persons actually temporarily lose their sight—usually in only one eye. Such cases are favorable candidates for the working of a marvelous miracle which often serves to help in the establishment of some new religion or to assist in the introduction of some new system of medical practice.

SQUINT—CROSS-EYES

Squint (strabismus) is found in children whenever the two eyes are not directed toward the same object. Ordinarily the muscles can keep the eyes lined up properly, but if, owing to faulty action on one side or the other, one eye deviates, then we have this condition which is commonly known as squint, or a "cast" in the eye.

Sometimes sufferers from this defect learn to ignore the image formed by the squint eye. This power of suppressing the false image leads to bad habits of vision, and should not be neglected. The most common form is where one side turns in toward the nose.

Squint sometimes comes on very early and not infrequently follows measles or whooping cough. It is also a fact that the squint is most noticeable when the child is out of sorts, is tired, or excited, and it is therefore most apparent at night, and especially when the eyes are strained by close work, or by the removal of the spectacles.

Contrary to the common belief, children very seldom outgrow squint. If it is neglected, the squint eye usually becomes blind from disuse. Neglected cross-eyes are responsible for many blind eyes in adults. All this can be prevented by fitting glasses early to the eyes and wearing them faithfully. If this measure fails, the eyes should be corrected by a surgical operation.

EYE STRAIN

Eye strain is the result of overworking the muscles of accommodation as the result of errors in vision which have not been properly corrected by glasses. We are particularly likely to have eye strain where the error is small, as in the case of slight astigmatism, so that the strain goes on in this unsuspected manner for months and years until it shows itself in headache and nervous exhaustion. When the defects of

vision are very marked, the muscles of the eye do not make any effort to correct the difficulty and no eye strain exists. The vision is simply very bad. Such individuals soon learn that no effort on their part will improve the vision and they seek the aid of glasses.

Eye strain manifests itself in a number of different ways, as follows:

1. *Eye disorders.* As the result of overwork there ensues inflammation which may produce pain in the eye, heaviness of the lids, and the eyes may feel sandy, that is, like small particles of sand on the lids. They may become unusually sensitive to light and wind. They may be weak and watery. Styes are frequent. There will be inflammation in the roots of the eyelashes. In some cases in children, it may even lead to ulcers on the eyeball and some authorities think eye strain may even dispose to that dread disease called glaucoma.

2. *Headaches.* We know that diseased teeth may produce neuralgia far away from the site of the tooth itself, and so eye strain can produce headaches and other nervous symptoms that seem to be but remotely related to the eye itself. Many a headache has been cured by having the eyes properly fitted to glasses. Some headaches from eye strain do not appear as might be expected just back of the eyes, but at the top or back of the head.

3. *Nervous exhaustion,* neurasthenia, hysteria, sleeplessness, and a whole group of nervous disorders ranging from giddiness on the one hand to brain fag on the other, have all been from time to time charged up to eye strain; all of which could have been prevented by wearing a pair of properly fitted glasses. No doubt many great men have broken down nervously as the result of eye strain, and eye specialists believe that such men as Darwin and Huxley would have given an entirely different service to the world had they been properly fitted with spectacles.

PREVENTABLE BLINDNESS

Blindness is on the decrease in recent years. This fact is a reason for still greater endeavor. We are winning a fight. The fact that we are winning calls for renewed, redoubled endeavor, that the enemy may be wholly routed. However, much remains to be done.

1. *Gonorrheal infections.* Some children under ten years

of age are blinded by reason of accident, but the very important cause of blindness in this group is what is known as ophthalmia neonatorum—gonorrheal infection occurring during birth or within the first few days thereafter; and as might be inferred, this form of blindness is wholly preventable. If the babies' eyes are properly cared for at birth there will be no blindness of this sort.

2. *Trachoma.* Another cause of preventable blindness is trachoma. Napoleon went to Egypt with an army and nearly every one of his soldiers got trachoma. From the armies it spread to the people. From the European peoples it spread to the United States.

Not only is it to be found everywhere in the congested quarters of our great cities, but it has penetrated to the most inaccessible of our mountain population.

The keynote of the trachoma situation is cleanliness. It is difficult to cure these cases of trachoma, but it is easy to prevent them. The necessity is for clean wash basins, clean water, clean soap, clean towels, clean hands, and clean faces.

It is highly desirable to have separate wash basins and separate towels under all circumstances. When a case of trachoma develops in a family, a school, or in a factory, what before was desirable becomes absolutely necessary.

3. *Wood alcohol.* Among the common dangers to which human eyes are exposed may be mentioned the fumes of wood alcohol, which is probably one of the worst causes of blindness, and one of the most common places we meet alcohol of this sort is in shellac. Blindness also results from drinking wood alcohol. Blindness from this cause is frequently encountered in those who have drunk illicit alcoholic beverages since the enactment of prohibition.

4. *Other causes.* Tobacco and lead workers also suffer from poisoning of the optic nerve. All dusty trades are hard on the eye; those that employ emery wheels, and also the metal and stone polishers. Masons and plasterers suffer from the effects of lime on the eyes, and flour mill employees are prone to eye troubles. Those who work around arc lamps or other intense light or heat have eye troubles; and snow-blindness belongs to this group. Glass blowers have a great deal of trouble with their eyes, as also do those who work around open fires and molten metals. Cataract is often the result of undue exposure to light and heat.

HYGIENE OF THE EYES

Those desiring to retain good eyesight should avoid tobacco and alcohol. In many persons tobacco has a decided effect upon the sight, and weakness of the eye is often due to its excessive use. Tobacco may produce a sort of color-blindness, marked congestion, and temporary blindness, which in time may lead to disease of the optic nerve, producing blindness, beyond recovery. Alcoholic poisoning has a profound effect upon the eye, and the vision is greatly impaired.

In summing up the hygiene of the eyes, care should be exercised along the following lines:

1. Avoid reading in a dark room, in the dusk of the evening, or by poor, distant, or crossed lights.

2. Avoid reading with the light in front of you, but rather have the light fall over the shoulder; otherwise use an eye shade.

3. Avoid dazzling lights and sudden changes in extremes of light, and never use the eyes when light is painful to the sight.

4. Avoid reading during sickness, and after measles, scarlet fever, or any exhausting disease.

5. Avoid reading when lying down. This is an unnatural position, straining the eye and producing congestion.

6. Avoid reading, at least for any length of time, on a moving train or when riding in an automobile, for the constant jar changes the focus of the eye, necessitating constant action of the ciliary muscles in accommodation.

7. Avoid prolonged use of the eyes for near or fine work; especially at night avoid sewing on black material. Rest the eyes frequently by looking at objects at a distance.

8. Avoid reading in a stooped position, for this interferes with the return circulation, and congests the eye and the brain.

9. Avoid rubbing the eyes with the hand or with a rough cloth, but rather bathe them in cold water twice a day.

10. Do not persist in using the eyes when everything appears hazy and the letters blur—obtain suitable glasses.

11. Popular eye washes, and various patent ointments, salves, etc., prepared according to popular recipes, or sold by quacks, should never be used.

12. Upon the discovery of any defect in the sight, consult

a competent physician (not a traveling quack) at once, as serious disease may be saved by timely advice or treatment.

13. Do not wear dotted or figured veils. These are responsible for much eye strain. They should be thin, and of a large uniform mesh, if worn at all.

14. Electricity is better than gas an an illuminant, because it affords a much steadier light, and the atmosphere is not vitiated by the gas consumption, nor is so much heat generated. The frosted globe is preferable, but in any case the light should be shaded and never be allowed to shine directly or by reflection into the eyes.

15. Sore eyes, squint, and headache may often be prevented or cured by wearing spectacles. Remember that an operation may cure a squint, but it cannot restore sight to an eye blind from squint. Eye strain, the result of optical error, is often responsible for serious mental and physical incapacity and suffering.

16. A child should not be sent to school without the slightest inquiry on the part of the parent or teacher, as to whether it sees objects sharply and well defined, or indistinctly and distorted; whether it be near-sighted or far-sighted; whether it sees with one or two eyes; or finally, if it does not see clearly and distinctly, whether it is not using a quantity of nervous force sufficient after a time not only to exhaust the energy of the visual organ, but of the entire nervous system.

CHAPTER XV

THE EAR AND DEFECTS OF HEARING

Of the more common disorders of the ears, some are ordinarily trifling, others are extremely serious. We very much question the wisdom of mothers treating earache with some home remedy instead of calling the doctor. While some troubles with the hearing are hereditary in their tendency, nevertheless, the majority of deafness is due to neglect of ear disorders which, though trifling at first, sooner or later develop into serious diseases of the organ of hearing; and many times these conditions are allowed to become chronic so that in the end they culminate in a partial or complete loss of hearing.

EARACHE

The greatest reason of all for giving early and thorough attention to earache in the matter of treatment is that earache is remotely connected with deafness, and it comes about in this way: The majority of people who become deaf or more or less hard of hearing in middle age do so as the result of infection which has traveled from the nose and throat, from diseased tonsils and adenoids, as well as other nasal disorders, up through the Eustachian tube to the middle ear. Now, when infection of this sort is acute, then we have severe earache. When it is chronic, low-grade infection, then we just have a slowly oncoming deafness.

This tendency for the ears to become infected comparatively early in life seems to be a hereditary tendency, for it sometimes runs in families, as has been shown by the researches of Dr. Alexander Graham Bell. You cannot afford to neglect earache if you belong to one of those families whose members tend to get hard of hearing when they are about fifty years of age.

Causes. Aside from preëxistent disease of the nose and throat, earache is brought on by exposure, acute sore throat, tonsilitis, and by the conditions that follow measles, scarlet

fever, diphtheria, and typhoid. It is also brought on by the violent snuffing of water up the nose, and probably one of the most common causes is violently blowing the nose, especially when one or both of the nostrils are obstructed in order to facilitate forceful blowing.

Symptoms. Ear infections which are the cause of earache are often betrayed by a sensation of fullness on the side of the head, ringing in the ears, sometimes there is actual swelling behind the ear, severe pain and very often, especially in children, there is fever. Sometimes very young children put their hand to the ear when crying, which gesture is sufficient to point to the ear as the source of the trouble. Pressure behind the ear usually increases the pain in severe ear infections. Sometimes the drum will rupture and pus will discharge. Sometimes it is best to have an ear specialist open the drum by means of a small knife.

Wax in the ear. Hardened wax in the ear canal can produce a variety of unpleasant symptoms, including sudden deafness. A physician will promptly remove the wax and relieve the patient. Do not undertake to remove wax with tweezers or other instruments; such meddlesome methods may injure the ear and thus permanently affect the hearing.

HEAD NOISES

Patients are all the time coming to consult us because they have some noise, roaring, or other difficulty in the head. Now, most of these troubles are in the ear. There are a great many affections which may upset, disturb, or slightly stimulate the ear mechanism, any one of which will be recognized by the brain as a sound. It will be recalled that when we get a sudden blow on the eye that we see "stars"; now, when the regions of the internal ear are irritated we hear "noises."

Sometimes this humming noise in the ear is set up by wax in the outer ear, the removal of which stops the head noise. Sometimes we have hypersensitive hearing; and as a result of the attention associated with nervous stress and lowered nerve tone, the patient hears all sorts of noises, all of which can be stopped by wearing a little cotton in the ear. Sometimes attention to the nose and throat and the proper treatment of catarrh of the Eustachian tube relieves these distressing head noises.

Sharp noises like a hammer striking an anvil are thought

by physicians to be due to trouble in the bones of the inner ear, and by proper hearing tests, by means of the tuning fork, the physician is able to determine whether or not the trouble is in the bones of the ear. One thing is sure, if we take good care of the health, as regards sleep and rest, work and play, diet and bowel elimination, we sometimes tend to lessen these distressing head noises; but in many cases, especially in nervous individuals, I have never been able to discover a cure.

These people simply have to learn to get along with their head noises just like we folks who live in the city with street cars and elevated trains learn to sleep soundly with these things going on all night. We cease to pay attention, and so these sufferers from head noises can train themselves to forget it, to quit listening for these disturbing noises, just as we have to train certain nervous patients to quit listening to their heart beat; as many neurotic individuals, if they practice a while, can hear every beat of the heart.

VERTIGO—DIZZINESS

There are many degrees of vertigo, varying from blurred vision up through sensations of disturbed equilibrium—including those feelings which the patient ordinarily describes as dizziness or giddiness. These sensations may be very slight, or may be so severe as to produce a stumbling gait.

In a large number of hospital patients who gave dizziness as their chief complaint, when analyzed, the following causes, in the order of their frequency, were discovered:

1. Diseases of the ears, or disturbances in hearing.
2. Arteriosclerosis, or hardening of the arteries.
3. Diseases of the brain—tumors, etc.
4. Menopause—the change of life.
5. The onset of some acute disease.
6. Neurotic states—neurasthenia, migraine, etc.
7. Diseases of the eye—defective vision.
8. Anemia—impoverished blood.
9. Heart disorders—impaired circulation.
10. Locomotor ataxia—tabes.
11. Exophthalmic goiter.
12. Epilepsy.

In addition to dizziness as a symptom of some disturbance or disease in the body, it should be remembered that healthy

persons may get dizzy under certain circumstances, such as the following:

1. Most normal individuals may experience dizziness when they look down from a great height, or when they spin around rapidly, as in waltzing without reversing.

2. Certain persons become dizzy if they ride backwards in a railway train, or when they watch continuously moving objects, such as waterfalls, or clouds moving overhead.

3. Certain persons become dizzy if they turn the head quickly, rise out of bed suddenly; or on suddenly rising from a stooping posture, or by quickly looking at the ceiling.

4. There is a definite condition often associated with dizziness which is known as car-sickness or seasickness.

5. Some persons, when they experience the passage of a galvanic current through the head, or when the external ear is douched with hot water, experience dizziness.

In general, it should be remembered that dizziness is not a serious symptom, especially in young people. In older people it may be one of the many symptoms of arteriosclerosis.

Those cases of dizziness which are due to sudden change of position should not usually be taken seriously. Many nervous people are also prone to giddiness on exposure to bright sunlight. In some cases it is a question as to whether dizziness is due to overuse of alcohol or tobacco, or whether it is purely a nervous manifestation.

In case of brain disorders and hardening of the arteries, there is a tendency to stagger and sometimes fall; whereas in the case of neurotic patients, they complain of dizziness but never fall. Some neurotics get dizzy in wide open places, others experience giddiness when in closed places, such as the church or the theater.

We must not forget that anything which interferes with the circulation of the proper amount of blood through the brain is liable to lead not only to giddiness, but also to fainting. These conditions are always present in anemia, general debility, sluggish circulation, and giddiness would be expected, of course, after a severe hemorrhage.

EARLY SIGNS OF DEAFNESS

While there are elaborate methods which the expert physician can use in testing the hearing, and in case of suspected deafness, such service should be sought; nevertheless, there

are simple ways in which one can test their hearing, such as the following:

Seek out a perfectly quiet room and find out if the tick of an ordinary watch can be heard at two feet, and if a whisper can be heard at eighteen feet. Test out each ear with the other covered by the hand or closed with a pledget of cotton. If it is desired to follow this up further, you can ascertain if a tuning fork held an inch from the ear can be heard for eighty seconds.

The chief causes of deafness are:

1. Hereditary tendencies.
2. Catarrh of the Eustachian tube.
3. Disease of the middle ear.
4. Infected adenoids and tonsils.
5. Chronic nasal catarrh.
6. Scarlet fever, measles, influenza, etc.
7. Hardened wax in the ear.
8. A blow on the ear—"boxing the ears."
9. Foreign bodies in the ear.
10. Loud noises and shrill sounds.
11. Hysteria—neurotic tendency.

CARE OF THE EARS

At the entrance of the auditory canal are numerous hairs, which serve to keep out dirt and insects. The lining membrane of the canal contains small glands, which secrete a thick, yellowish, oily wax, which is very bitter. Because of this bitter taste, no insect will, of itself, invade this canal. What becomes of the wax? It dries up in the form of small whitish scales, which peel off from the surface, and, aided by the action of the jaw, drift out of the ear.

The ear canal seldom gives us trouble unless we make too frequent attempts to keep it clean. It is for this reason that some people who are more or less fastidious in their habits suffer most from ear troubles. Many well-meaning mothers do more harm than good by trying to clean the wax out of their children's ears. Twisting up the corner of a towel or handkerchief and turning it round in the ear is one of the worst methods of getting out the wax, and it does a great deal of harm. It is a dangerous practice to introduce ear

spoons, ear sponges, pins, hairpins, toothpicks, etc., into the ear to remove the wax.

Washing the ear canal with soap and water is also injurious, as it moistens the wax, thus increasing its quantity, and forming a better surface for the collection of dust and dirt. Washing should extend no farther than the finger can reach.

Cold water should never be put into the ear. Bathing and swimming with the ears submerged is no doubt one of the causes of ear trouble. Cotton should be placed in the ear if one is going to dive while in swimming.

The practice of boxing a child's ears is both wicked and cruel, for it drives the air with such force against the drumhead that it is often ruptured, resulting in impaired hearing. Supposed inattention in children is often due to impaired hearing. Such children are often suffering from adenoids.

CHAPTER XVI

HYGIENE OF THE TEETH AND MOUTH

The neglect of sharp, ragged edges on the teeth results in an irritation of the mouth and especially the tongue, and is the cause of many cases of cancer. Under no circumstances should jagged edges of teeth be neglected. They should be rounded off by the dentist and in this way much cancer of the tongue can be prevented.

The natural saliva should be alkaline or neutral, but owing to the presence of so many germs, the majority of people actually have an acid mouth. This is probably one of the influences predisposing to pyorrhea.

It is commonly believed that the loss of the teeth occasions indigestion, but we think that the influence of toothlessness as a cause of digestive troubles has been greatly exaggerated, as we seldom see cases of real stomach trouble that are due to loss of the teeth.

CARE OF THE TEETH

Heretofore most of our teaching about the care of the teeth has been with the idea of preventing decay. We now know that the presence of the proper amount of calcium and other salts in the food will do more good than all the care we can give by way of brushing, mouth washes, etc. We are now more concerned about keeping the gums hard and healthy, to see that they do not become soft and spongy, that pyorrhea does not develop with its tendency to absorb pus germs and toxins into the blood to produce serious diseases in the heart, joints, and elsewhere.

We try to break the infant of its habit of thumb sucking because we believe that it leads to a protrusion of the teeth of the upper jaw, and in this way interferes with the proper arrangement of the teeth as they come in. Dentists to-day are able to do much to straighten crooked teeth and otherwise

to assist in overcoming irregularities and abnormalities of various kinds, and children who are thus afflicted should be early taken to an expert dental surgeon.

Decay is further prevented by keeping the teeth well polished—by producing smooth surfaces. If the teeth are smooth and clean and are provided with sufficient salts in the blood, decay will be seldom met with.

One of the great reasons for going to the dentist two or three times a year is to have the teeth polished, tartar deposits removed, and their surface kept thoroughly smooth and clean. This is the best method for preventing decay, and is of far more value than even the daily use of the tooth brush.

The brushing of teeth is probably made necessary by the fact that the saliva is not always of the proper quality to keep the mouth partially disinfected. If the teeth are to be brushed once a day, it would probably be best to do so just before retiring. The brushing of the gums is equally important with the teeth as it serves to keep them hardened, to promote the circulation of the blood, and in this way atones for the eating of so much soft and sloppy food. The gums need to be massaged, as in the eating of hard food. From the standpoint of the gums, the toothbrush should be moderately soft.

SO-CALLED DEAD TEETH

My own attitude on dead teeth is that if an X-ray picture shows no pus sacs at the roots, if the tooth is making no trouble, if the patient is in good health, and has no neuritis, neuralgia, or rheumatic joints, and if the tooth is useful—I say, in such cases, my attitude is to mark time. I have never quite accepted the teaching that all pulpless or so-called dead teeth should be immediately extracted. I certainly do believe that all dead teeth should be suspected and watched, and sooner or later they may have to be removed, but in the absence of symptoms of any kind, we should be conservative, just as we would hardly like to take the position that all enlarged tonsils should be removed just because the vast majority are also infected. Much good has been done by this agitation for the removal of pulpless teeth, but every now and then we meet with someone whom we think has needlessly sacrificed some or all of their teeth and who are in no wise improved as far as their rheumatism and other distressing symptoms are concerned.

The dentists must pay more attention to the routine X-raying of the patient's teeth and not wait for doctors to find heart disease and rheumatism before they look into infections at the roots of their crowned teeth. Many dentists make the mistake of trying to crown and save dead teeth only to endanger the health of the patient, whereas an X-ray picture would have shown a condition that would have led to extracting the tooth rather than further tampering with it to the jeopardy of the patient's health.

Those who have studied the roots of dead teeth claim that 70 per cent of them are infected. Some authorities believe that a dead tooth means sooner or later an infected tooth.

Of course, not all joint infections arise in the mouth, nose and throat, since we can have arthritis in connection with syphilis, gonorrhea, tuberculosis and gout.

PYORRHEA

Pyorrhea is an inflammation of the membrane which surrounds the roots of the teeth beneath the gums. It usually starts in as an inflammation or infection of the free border of the gums where they join the teeth. Many different germs are now believed to be able to cause this disorder when there is irritation or a lowering of the vital resistance of the gums, and very soon, as the disease progresses, the gums begin to retract from the teeth, to shrink away, and pretty soon the teeth begin to loosen. It is believed that this disorder may be also favored by ill-fitting bridges, and other conditions, including crowns, which result in the accumulation of tartar on the teeth around the edge of the gum, and it is no doubt favored by neglect to have this tartar regularly removed. Some dentists believe the gums are infected by careless use of toothpicks, overharsh tooth brushes, eating food that is too hot, and the condition seems to be favored by constitutional diseases like Bright's disease, tuberculosis, and diabetes.

There can be no doubt but that pyorrhea is responsible for stomach trouble and it undoubtedly contributes to the causing, in many cases, of gastric ulcers, appendicitis, and gall-bladder infections, not to mention heart disease and rheumatism.

While looseness of the teeth and pus which is made easily to exude from the gums is an indication of pyorrhea, or Riggs' disease, it should be remembered that infection may form in

pockets around the teeth and may not be evident to a superficial examination.

If taken in time, many cases of pyorrhea can be cured, but it requires persistent treatment. This is a case where it is far better to practice prevention. The disease is easily prevented by proper care of the teeth and maintaining good general health, and as the treatment is very unsuccessful at present, as a cure cannot be promised in most of the advanced cases, the prevention of the disorder is all the more important.

USELESS DENTAL WORK

It is a great mistake to spend hundreds of dollars for having elaborate bridge work and beautiful crowns attached to dead teeth—especially if the teeth have not been X-rayed. And it is encouraging to see that dentists are beginning to recognize the mistakes of the past, says Dr. New, at the Mayo Clinic:

> It would seem that in the future the conscientious dentist, knowing the terrible suffering and mortality of the results of the past era of dentistry (general disease arising from improper care of the teeth and gums), would warn patients of the possibility of the presence of dead teeth in the mouth, and discuss with them the dangers of crowns and bridges. Unless the dentists of to-day can perfect their technique so as to give all their patients clean mouths, free from abscesses and gum inflammation, the old-time dentist who extracted teeth and put in plates was really a more useful member of the profession, for with his methods the mouth was at least kept free from foci of infection.

CHAPTER XVII

PREVENTION OF DIGESTIVE DISORDERS

The more common causes of indigestion include: Anxiety; worry; overfatigue; sedentary life; abuse of tobacco, tea, and coffee; insomnia; undue excitement; sexual excesses; irregularity in time of eating; improperly cooked food; unpalatable food; unfavorable surroundings; hasty eating; eating alone; abuse of alcohol; drinking too much water at meal times; and lack of appetite.

THE RÔLE OF APPETITE

A good appetite ordinarily is evidence of good digestion. The digestion is seldom good when the appetite is poor. If you have a poor appetite, the thing of first importance is to look yourself over and find out what you can do to get a good, sharp, keen appetite for food. Are you getting a proper amount of physical exercise? Do you drink a sufficient amount of water? Take an inventory of your physical habits, and do not rest satisfied until you have gotten that greatest of all food sauces—a good appetite. And just in proportion as you improve your appetite, you will find that you are improving your digestion. Appetite is, therefore, not only the call of the nervous system—Nature's demand for food—but it is also the system's promise to digest and assimilate properly the food that is eaten in response to its call.

Appetite plays an important rôle in the secretion of the gastric juice, so much so that the juice present during the first half of digestion has come to be known as "appetite juice."

Certain stomach bitters and alcoholic beverages improve the appetite and, by increasing the "appetite juice," are able temporarily to improve the digestion. Alcohol probably accomplishes its deceptive work along these lines by lessening mental anxiety and producing a more comfortable and peaceful state of mind at meal time. These are false methods of creating a good appetite, and while they confer transitory help in this

direction, in the end the appetite will be found all the worse for this medical abuse. In the same manner, many of the harmful condiments and relishes may improve the appetite, thereby aiding digestion for the time being, but at the expense of irritating and congesting the digestive system, and laying the foundation for colitis and other diseased conditions.

The human appetite will probably never become a wholly safe guide in the wise and hygienic selection of food, being a highly specialized nervous function and subject to so many disturbing influences as well as being so largely a creature of education and habit. It will probably be found necessary constantly to guide and correct its choice by the higher centers of human reason and scientific judgment.

Says Osborne:

> Hunger sensations are due to contractions of the stomach. Smoking, sweets, water, and disagreeable odors just before meals inhibit the appetite. Mental depression stops appetite. The sight and smell of good food, or even the thought of palatable food, stimulates the gastric secretions and promotes appetite. Good cheer promotes appetite and digestion. Generally the desire for a certain kind of food or a craving for that food in health represents a body need for nutriment of that character. Of course this does not mean that the desire for such foods as appeal to the child's eye is a good indicator of what he really needs.

DIGESTIVE DISORDERS

About ten per cent of stomach troubles are due to ulcers, gall-bladder infections, appendicitis, etc. About ninety per cent are functional. Now, of these functional disorders about one-third, or thirty per cent, probably are due to general disease; one-third to prolapse of the stomach and abdominal organs, associated with inherited nervous weakness, and accompanied by more or less constipation; the other one-third are reflex stomach troubles, due to trouble in the gall-bladder, appendix, etc.

Some *ulcers* of the stomach, though not many, if neglected and allowed to run a chronic course over a long period of years, tend to turn into cancer.

It is an unsettled question whether to give preference in the treatment of ulcers to the medical or surgical treatment. My own experience has been that about one-half of the cases of ulcer of the stomach can be relieved by proper medical treatment. The other half show a tendency to recurrence and

many of them are not relieved until a surgical operation is performed. However, ulcer must be treated according to the individual indications.

In the prevention of ulcer of the stomach, we are handicapped by lack of knowledge as to the real cause, though there is more and more of a tendency to believe that they come from nose, throat, mouth, and teeth infections, or from focal infections in some other part of the body.

Among the contributing causes of ulcer are anemia; lowered vitality; excessive secretion of acid on the part of the stomach; gall-bladder infections, and chronic appendicitis.

The Sippy, or medical, treatment of these ulcers consists in giving enough alkali to neutralize the acid in the stomach, and to feed milk and cream often and in small amounts.

Gastritis is perhaps better known under the name of catarrh of the stomach. We don't find this disease much nowadays because it is a term that used to apply to most any stomach trouble, but we now apply it only to acute or chronic inflammatory conditions. Cases that used to be called gastritis are now designated as ulcer, gall-bladder trouble, appendicitis, etc. The leading cause of gastritis is the use of alcohol and over-indulgence in tea, coffee, and tobacco.

THOROUGH MASTICATION

Proper chewing is one of the great secrets of good digestion. Many persons in robust health are able to bolt their food regularly for years without discerning symptoms of dyspepsia, but all the while indigestion and dyspepsia in some form await them, as it were, disguised around the corner, and sooner or later they will recognize the painful protest of the long-abused stomach.

There can be no doubt that mastication can be overdone; that too little food can be eaten. The teaching that all food which cannot be completely liquified in the mouth should be rejected, and that only purely liquid portions should be swallowed, is certainly extreme. I believe in rational, thorough, simple mastication, but not in any such extreme teachings as would lead to the rejection of every bit of fruit, vegetable, or cereal pulp that cannot be completely liquified. While there is an occasional person whose health and digestion might be interfered with by over-mastication and consequent under-eating, we feel that ninety-nine out of a hundred of those with

healthy or sick stomachs would have their health and nutrition greatly improved by employing more mastication than is generally practiced.

The advantages of thorough mastication may be briefly summarized as follows:

1. Mouth digestion is the only part of the process of human digestion and metabolism which the man himself controls. If we start our food right in the mouth, where we control the muscles and are, therefore, responsible for digestion, Nature, all things being equal, will carry on the rest of the process with her customary accuracy and faithful attention to every detail.

2. While some species of serpents or crocodiles may have rudimentary teeth in the throat, man has no grinding mechanism below the mouth. Food that is not masticated properly in the mouth will greatly delay digestion, as the stomach ordinarily allows no solid food to pass its portals unless it has become thoroughly exhausted with previous efforts to empty itself when overloaded, or filled with poorly masticated food.

3. A cardinal principle of the science of mastication is that most natural foods, being of an acid flavor, should be retained in the mouth a sufficient length of time to become more or less alkalinized by the action of the alkaline saliva. This is especially the case with persons suffering from acid dyspepsia, sour stomach, etc.

4. Another important reason for mastication is that the flavoring substances may become dissolved, so as to be able to circulate around the taste-buds at the base of the tongue; for the proper digestion of food in the stomach, the secretion of the gastric juice, etc., are largely dependent upon the taste of the food in the mouth.

5. Starch is digested by saliva. The mouth is a real organ of digestion. The food should remain in it long enough to permit this starch-digestion to be thoroughly begun.

6. Thorough mastication is the one sure way to prevent overeating—in fact, the only safe way. When, as the result of proper mastication, all food is tasted preparatory to being swallowed, Nature will ordinarily remove the appetite when a sufficient amount of food has been eaten.

7. The gastric juice penetrates solid food at the rate of only one millimeter (1-25 of an inch) an hour. Therefore, insufficient mastication must surely delay the process of digestion.

COOKING

The great value of cooking is to make the food more easy of digestion, to render it more tasty, and therefore more tempting to the palate, for if the mouth can be made to water, the stomach also waters, or, as a Russian investigator put it: "Appetite equals digestive juices."

A great deal of our cooking, however, is of no real value, as many green vegetables and ripe fruits are just as easy of digestion raw as cooked. In fact, in the case of cabbage, it appears that raw cabbage is more easily digested than cooked cabbage.

The great value of cooking is to disrupt the little woody envelope that surrounds the starch granules and therefore all cereals or starch containing foods, such as potatoes, are rendered more easy of digestion as the result of thorough cooking.

On the other hand, frying food, by saturating it with grease, tends to make it more difficult of digestion. Foods are somewhat more digestible when they are fried by means of deep boiling fat (220° F.) which causes an almost instantaneous hardening of the surface, which is soon covered with a uniform coating of fat, all of which results in generating steam within the food substance, and this prevents the food which is being fried from becoming so thoroughly saturated with fat and renders it more easy of digestion.

Some foods are rendered difficult of digestion because they are so overseasoned, contain such enormous amounts of fat, sugar, etc.

When meat, fish, and other foods are fried, a high temperature should be applied at first that an immediate coating of fat may be formed in order to retain the natural flavor. In fact, this is true of any food that is to be fried. Subsequently the cooking may be continued with more moderate heat. In the making of stews or soups, the opposite course is followed. The heat is moderate at the start and increased toward the end of the cooking process. To make a meat stew it is usually placed in cold water, enough to cover, and allowed to cook slowly until it reaches the boiling point, when most housewives put it on the back of the stove and allow it to simmer until it is thoroughly done.

Taking food too hot or too cold interferes with the process of digestion.

Of all the processes of cooking, baking is one of the best. For most persons it would be best to eat more baked and boiled foods, and less fried foods.

COMMON MISTAKES MADE AT MEALS

1. Eating too great a variety—too many dishes at the same meal.

2. Taking food that is too hot or too cold. Extremes of temperature are not good for the mouth, gums, throat, or stomach.

3. Overeating—eating between meals. Eat regularly—two or three times a day.

4. Drinking too much tea, coffee or alcoholic beverages. Even too much water is not good for some stomachs—especially ice water and iced tea.

5. Putting too much salt, vinegar, or other condiments on the food—overseasoning.

6. Eating too much meat. Eat less meat and more fruit and vegetables.

7. We eat too much soft food—mushes, soups, pastries, etc. Eat some hard food each meal.

8. Eating too much sugar—not to mention the eating of candies between meals.

9. Failure to maintain a pleasant and happy frame of mind during meals.

10. Midnight meals—late suppers following the usual evening meal—are unwholesome if frequently indulged in.

NERVOUS DYSPEPSIA

Nervous dyspepsia occurs in people of a certain mental and physical type. Physically they represent the tall, slender type, as a rule. The belly is more prominent below the navel. The backs are straight below the shoulder blades, lacking the normal curve in the so-called small of the back. These patients nearly always have a narrow angle in the upper part of the abdomen which is formed by the lower border of the ribs. The abdominal organs have a tendency to fall down into the pelvis. The abdominal muscles are flabby and the attachments of the internal organs are lax and long and all this favors prolapse, and prolapse favors nervous indigestion, constipation, etc. The whole condition is of course aggravated

and complicated by repeated pregnancies, as well as by faulty posture and sedentary habits of living.

Almost twenty-five per cent of women are of this unfortunate physical build which predisposes them to digestive trouble due to visceral prolapse, but as a rule the symptoms of the trouble do not appear until they are thirty years or more of age, when the effects of living and the long continued stress on the nervous system begin to tell.

The first symptoms of nervous dyspepsia, of a specific nature, are usually described as a feeling of fullness and distention in the stomach, heart-burn, loss of appetite, nausea, headache, etc. These are the people who have loss of muscular tone in the digestive mechanism and when lying down on the back, if the hand is pressed up and down over the stomach, a splashing sound will usually be heard. Now this symptom might be found in anyone immediately after drinking, but it is not found in normal persons as frequently as it is in these cases of nervous indigestion.

Now we have another group of patients who have nervous dyspepsia. Sometimes they are in good flesh and they are not suffering from any prolapse of the internal organs, so that in their case the physical factors are absent. *It is purely a case of stomach trouble in the head.* These are the cases that can be helped more by means of proper habits of thought and improved dietetic practices.

In the case of nervous dyspepsia, the patient suffers almost constantly from distress and digestive disturbances, but as a rule does not have actual pain, which is always present in organic diseases of the stomach, such as ulcer, cancer, etc. The presence of enteroptosis, prolapse of the internal organs, in itself is presumptive evidence in favor of functional digestive disturbance, rather than organic disturbance.

The prevention of these forms of nervous indigestion must be begun in the cradle by teaching the child self-control; in fact it should be begun in choosing one's ancestors if that were possible. These are the patients that must be kept well nourished and who are benefited by going to bed on a rest cure for eight or ten weeks with the foot of the bed elevated.

Teaching *correct posture* in standing and sitting is also of value in these cases. Following childbirth, women of this class must be very careful to wear a properly fitting support

to help the weakened muscles of the abdomen hold up its contents.

Physical exercises of the proper sort will assist in this matter both as a preventive and curative measure.

It is very seldom that a surgical operation can be performed that will be of any value to these nervous, underweight patients. Not one time in a hundred will we consent to operate on these patients. It is only when the prolapse is of such a nature, complicated with adhesions, or in some way presenting danger of actual obstruction, that an experienced surgeon will consent to operate on these patients.

When indigestion is a part of neurasthenia and hysteria, it must be helped by an effort to improve the underlying neurotic condition.

CAUSES OF DIGESTIVE TROUBLES

Digestive troubles may roughly be put into the following three groups:

1. *Primary stomach disorders.* This group includes ulcer of the stomach, dilatation of the stomach, increased or decreased secretion of hydrochloric acid, etc., including slow emptying time. While focal infections may sometimes cause gastric ulcer, atony and slow emptying is more often due to nervous depression and exhaustion.

2. *Nervous stomach disorders.* These are the cases resulting from a general prolapse of the abdominal organs in cases of hereditary tendency to this disorder. These patients are usually highly nervous. The prevention of this group of stomach troubles consists in efforts looking toward fattening the patient, improving the nerve tone and supplying properly fitted abdominal supporters to assist in holding up the sagging internal organs.

3. *Reflex stomach disorders.* About ninety per cent of our stomach troubles have their origin outside of the stomach itself. They are caused by gall-bladder infections, gall stones, ulcers of the bowel, appendicitis, kidney stones, chronic constipation, colitis, pelvic disorders, worry, nervousness, etc. No doubt much of the gall-bladder trouble, duodenal ulcer, and appendicitis come from infections in the mouth, nose, and throat.

In all of these cases a thoroughgoing X-ray bismuth meal

examination should be made of the entire gastro-intestinal tract. Sometimes the surgeon is the best diagnostician of stomach trouble because of his working knowledge of the common causes of abdominal disorders in general.

The *prevention* of digestive disorders involves:

1. The recognition and removal of real organic disease—such as ulcers, gall-stones, appendicitis, etc.

2. The practice of good hygiene as regards mastication, diet, and other habits relating to digestion and nutrition.

3. The prevention of chronic constipation and associated autointoxication.

4. Keeping the mind off the stomach. No first-class stomach will do good work if you "spy on it." The quickest way to get your stomach out of order is to begin thinking about it.

LIVER TROUBLES

The liver stands between man and death several times every day. If it should cease operations for twenty-four hours, death would surely follow. Man has been known to live for years after the removal of the stomach, for years after losing several feet of intestine, or one of the kidneys, but he has only one liver, and when it fails life goes with it.

As the blood soaks down between the liver cells, which have been called the "food inspectors," the food suitable for body building is allowed to pass on, while the poisons and other waste materials are modified and destroyed, and are then carried out through the excretory ducts as bile.

There is a limit, however, to the poison-destroying power and capacity of the liver. As a rule, the liver cells are greatly overworked. Most people eat more than is necessary, hence these faithful inspectors have more than they can do, and many things slip into the blood without being passed upon. Moreover, the liver becomes tired from constant overwork, gets behind in its work, and finally becomes completely discouraged. Then comes *autointoxication,* which literally means poisons in the blood. Some call this state of affairs "biliousness."

The Greeks connected great depression of spirits with disorders of the liver; hence the term melancholy, which means "black bile." There is no doubt that an inactive or overburdened liver has been the cause of many sudden deaths, having produced the desire for self-destruction.

CHAPTER XVIII

FOOD SUBSTANCES

Good digestion and sound health demand that our daily ration should be fairly well balanced. That is, our meals should not consist altogether of starchy foods or sugar, nor should they be composed exclusively of proteins—nitrogenous foods. There should be a balancing of the bill of fare, so that the various food factors which are required to nourish the body and to furnish heat and energy may be proportionately present in the food eaten.

BALANCED EATING

To illustrate, one would not want to make a meal of meat, potatoes, bread, and butter, with beans and cheese added. This would afford altogether too much protein. Neither should a meal consist entirely of fruit and vegetables. There would then be a deficiency of protein and fat. Rice, fruit, and nuts would produce a pretty well balanced bill of fare for a single meal. There is great danger of eating too many nuts at a time, as they are highly concentrated. They are used in the place of legumes, meat, and eggs. There is also great danger of eating too great a quantity of dried beans and peas.

A study of any food table will make it plain just what combinations of food at one's disposal will properly balance the bill of fare so as to provide the desired amount of protein, fat, carbohydrates, etc. The salt and cellulose will take care of themselves except in such cases as children with rickets, who probably require an extra amount of salts, or in cases of chronic constipation, which make it wise to provide food with considerable cellulose. The vitamins will be taken care of automatically if some fresh fruit and green vegetables are eaten each day.

In pregnancy, overfeeding the mother is liable to cause toxemia rather than to be of benefit to the unborn child or to herself. In general, the mother should eat very little more

than would be commonly required for her own nourishment. The diet should be so managed as to prevent acidity.

Rare or improperly cooked meats, particularly pork, are highly dangerous because of the parasite, trichina, which it may contain. Underdone beef may contain tapeworm.

THE FACTORS OF NUTRITION

There are seven factors entering into the composition of human food: Protein, starch, sugar, fat, salts, cellulose, and water. These substances are all variously concerned in the nourishment, energizing, and warming of the body.

1. *Proteins.* The proteins are the structure builders of the body. Under certain circumstances, a portion of the proteins may be used for fuel, provided there is either an overabundant supply of this food substance in the blood stream, or a lack of the ordinary fuel substances, as in case of starvation. It is very necessary to have the proper amount of protein each day, but an over-supply is highly injurious to the body. It is highly important that the protein factor of the food should be properly balanced in its relation to the non-protein substances. While starches, fats, and sugars may be compared to the coal that feeds the locomotive, the proteins represent the iron and steel that are used from time to time to repair the engine and replace its worn parts.

The most common forms in which protein is used for food are the glutens of the grains, the legumes, nuts, cheese, the white of egg, and lean meat.

2. *Starches.* The starches are the most abundant of all factors in human food. They enter largely into the composition of nearly all plants and seeds. Under the influence of the sunlight, the green-colored plants gather up the CO_2 of the air, and, with the water absorbed from the ground, build up starch. The plant takes all the carbon from which starch is made from the air, but while the atmosphere contains almost 80 per cent of nitrogen, the plant is unable to use it. It must secure its nitrogen from the decaying refuse of the soil. Thus the plant utilizes the waste products found in air and earth in the building of its food substances. Starch exists in the form of small granules. Each little starch granule is surrounded by a woody envelope of cellulose. It is necessary to cook all starches thoroughly in order to burst this cellulose covering and thus enable the saliva to begin its work of diges-

tion. All the cereals, breads, breakfast foods, legumes, etc., are about three-fourths starch.

3. *Fruit sugars.* The sugar of fruits represents a form of food requiring no digestion, while the sugar found in beets, the cane plant, and the maple tree must be acted upon by the digestive juices of the intestines before it can be absorbed. During the winter, the maple tree stores its carbohydrates in the roots in the form of starch. With the advent of spring, Nature begins the digestion of this starch—actually turns it into sugar—and in the form of the sweet sap, it is carried up into the tree trunk to be deposited in the leaves and bark in the form of cellulose, a process very similar to that performed by digestion in the human body, where starch is first turned into sugar, and afterwards deposited in another form in the liver and muscles. *Dextrin* is a form of sugar resulting from thoroughly cooking or partially digesting starch. There are about twenty-five stages or forms of dextrin between raw starch and digested starch or fruit sugar. Dextrin is found in the brown-colored sweet portions of well-toasted bread.

4. *Fats.* Fat is a combination of glycerin and certain fatty acids. As a food, it is derived from both the animal and the vegetable kingdom. Animal fat consists of lard, suet, fat meat, etc., while fat of animal origin is represented by cream, butter, and eggs. The vegetable fats are found in nuts, especially the pecan, coconut, Brazil, and pine nuts; also in the grains, particularly oats and corn. The peanut also contains a considerable amount of fat. Of the fruits, the banana and strawberry contain a trace of fat, while the olive is the only fruit rich in fat. As a food, fat is used in three forms. The emulsified form is represented by cream, olive oil, and nuts. When the tiny globules of fat, which are each surrounded by a little film of casein, are crushed—united into a solid mass—we have a free fat. This form is represented by butter and other animal fats. Another form is fried fat—fat which has been chemically changed by heat.

5. *Mineral salts.* The mineral elements comprise but a small part of human food as regards weight, but they are extremely important to the health of the body. These salts are of great value to the various fluids of the body, and also as stimulants to nerve action, but more particularly in the work of building up the bones. We habitually take too little calcium salts and too much sodium—common table salt. Salts

are found largely in the cereals. A small amount is also found in vegetables, particularly the potato, as well as in most fruits.

6. *Cellulose.* Cellulose represents the great bulk of all vegetables and fruits. It is digested by most animals, but in man it is digested only to the extent of about 30 per cent. The presence of a large amount of cellulose in the food enables us often to satisfy the appetite without injury from overeating. It serves to give bulk to the food, and thereby acts as a preventive of constipation. The secretion of the intestinal juices and the intestinal movements are greatly favored by the cellulose-bulk of the food. Too much cellulose in the food favors intestinal fermentation, as this food substance is largely acted upon by the germs which live in the bowel tract. The principal part of the bran of wheat is cellulose.

7. *Water.* Water fills an important place in the nutrition of the body. The food changes in connection with digestion, assimilation, and elimination can take place only in the presence of water. Water constitutes from 15 to 95 per cent of the various foods. The watery juices of vegetables and fruits consist largely of pure distilled water, in which fruit sugar is dissolved, with added flavoring substances. Water is absolutely essential to the performance of every vital function connected with human metabolism.

CHEMISTRY OF FOODS

The following classification of foods will show at a glance those which contribute to increasing or lessening alkalinity.

I. Foods Which Diminish Alkalinity of the Blood.

1. *Animal foods:* All forms of flesh foods, fish, fowl, etc., including all kinds of meat broths, soups, beef tea, bouillon, etc.

2. *Eggs.*

3. *Breadstuffs:* All kinds of breads, whether made of wheat, rye, or corn, crackers, toasts, griddle cakes, etc.

4. *Pastries:* All sorts of pies and cakes (except fruit pies, and other desserts containing milk or sour fruits).

5. *Cereals:* Rice, oatmeal, and breakfast food of all kinds, including the flaked and toasted breakfast foods.

6. *Miscellaneous:* Peanuts, plums, prunes, and cranberries. (Plums and cranberries come under this heading because of their benzoic acid, which the body cannot fully oxidize.)

II. Foods Which Increase Alkalinity of the Blood.

1. *Dairy products:* Milk, ice cream, cottage cheese, cheese, buttermilk, etc.

2. *Soups:* All forms of vegetable and fruit soups and broths.

3. *Fruit juices:* All the fresh fruit juices (except plum juice).

4. *Fresh fruits:* All fresh fruits—sweet and sour (except plums and cranberries).

5. *Dried fruits:* All dried fruits (except prunes)—especially figs, raisins, dates, and currants.

6. *Vegetables:* All kinds—especially beets, carrots, celery and lettuce.

7. *The legumes:* Beans, peas, and lentils.

8. *Nuts:* All the nuts come under this heading, including almonds and chestnuts.

9. *Miscellaneous:* Potatoes and bananas.

We should not for one moment feel called upon to discard the acid, ash-forming foods—they are good foods, but those who are victims of a catarrhal tendency of the mucous membranes, those who are subject to chronic colds, headaches, neuralgias, and digestive disorders should see to it that they eat more liberally of those foods which are alkaline ash-formers.

DAILY FOOD REQUIREMENTS

It is important that man should have a well balanced ration. That is, his daily food should contain the proper amount of protein for the repair of the tissues, together with a suitable amount of starch, sugar, and fat to serve for the production of heat and energy.

As previously noted, the body is without power to store proteins if an excess of this element is eaten. The experiments of Professor Chittenden, of Yale University, have clearly demonstrated that the majority of civilized people are regularly eating more than twice the amount of protein required to nourish and sustain the body in a state of health.

Why is it that the majority of civilized men and women habitually consume from two to three times the amount of protein required to replenish the broken-down tissues? The answer is found in the fact that when the human body is overfed on protein, it acquires extravagant habits in this

respect. It develops what is known as the "protein habit." It learns how to dispose of this excess of protein, and grows so accustomed to the influence of these nitrogenous ashes and elements in the circulation that there is developed a sort of protein tissue-intoxication. There can be little doubt also that this extravagant protein habit is somewhat of a racial trait. This explains why some of the Oriental nations can maintain such good health on an extremely low protein allowance.

The average man, weighing 150 pounds, requires about sixty grams (2 ounces) of protein a day for the proper sustenance of the body; that is, to replace the tissues which are worn out and destroyed by ordinary use. This is the conclusion reached by Professor Chittenden after long and laborious experimentation.

The average adult requires a daily food supply which will furnish the body with from 1,500 to 2,500 calories. The size of the individual, the season of the year, the nature of his work, etc., are all concerned in the amount of food required to furnish the heat and energy needed for 24 hours. As a general rule, the average man or woman doing ordinary work in ordinary weather will get along nicely on a daily ration which will supply 2,000 calories. These 2,000 calories should be divided between the different food elements about as follows:

1. Proteins	200 calories	(about 1-2/3 ounces)
2. Fats	700 calories	(about 2-1/3 ounces)
3. Carbohydrates (starch and sugar)	1100 calories	(about 9 ounces)

To secure 2,000 calories as above outlined would require about 13 ounces of solid—water-free—food; but as our various food substances contain from 15 to 90 per cent of water, it will be necessary to use from 30 to 40 ounces of ordinary mixed-diet foods to get 13 ounces of real solid, water-free food elements.

CHAPTER XIX

VITAMINS—THE LATEST FOOD DISCOVERY

The name "vitamin" was coined by Funk, to describe a substance found in rice polishings and also in yeast, which appeared to cure neuritis in birds and beriberi in man. Later, Professor Hopkins called attention to the fact that many common foods contained certain hitherto unrecognized substances which he called *vitamins,* which substances, we have since come to recognize, are so essential to the enjoyment of good health and the prevention of certain serious diseases.

It is not known to-day whether these so-called vitamins act the part of definite chemical food substances, entering into the nutritive processes of the body, or whether they rather act as *catalyzers*—that is, to stimulate and encourage other changes or chemical actions on the part of the body's fluids or food substances, while they themselves take no actual part in the chemical reaction. They are difficult to isolate and are very unstable—chemically—so that their study is encompassed with many obstacles.

NATURE OF VITAMINS

By 1915 the study of vitamins had progressed to the point where McCollum was able to put them into two groups: the fat soluble "A," and the water soluble "B," and subsequently evidence accumulated showing a third group which came to be known as water soluble "C," this latter group having more to do with the prevention of scurvy. Still more recently we have had our attention called to the existence of a possible "D" group of vitamins, which seem to possess the property of stimulating the growth of certain bacteria—particularly yeast.

It is thought by some authorities that vitamins are not built up either by ordinary plants or animals, but that, after all, they are the product of bacterial action.

One thing is certain, their presence is essential to the growth

of ordinary yeast, and the rate of growth of the common yeast plant may be taken as the measure of the quantity of vitamins present in any given food substance. Vitamins are sooner or later destroyed by heat, if sufficiently intense or long continued.

From the standpoint of health, there are a number of things that it is valuable to know about one's food, such as the total nutritive value; the ratio of the various food elements as they may be combined in any given food, the relative digestibility, etc.; but of equal, if not of greater, importance is the question of *vitamins*—the presence of those subtle, and up to recently but little understood, chemical substances which exert such a tremendous influence upon health and disease.

It is not enough that a food should be nutritious. We have known that animals could sometimes be well nourished upon food that human beings would not thrive on, and we now know that a food may be in every way nutritious—even from the standpoint of human nutrition—that it may be comparatively easy of digestion, that it may be to a high degree assimilable in the human system, and at the same time—while it is in every way apparently an ideal food—since it is deficient in certain important vitamin compounds, it will prove to be a disastrous diet if used in too great quantities, or if the vitamins in which it is deficient are not supplied from other sources.

If foods are made chemically pure, overheated, salted, dried, or otherwise preserved, these vitamins may be destroyed. Their composition is unknown. Their value has been discovered by their absence. That is, people living on food lacking vitamins develop what are now well recognized as "deficiency diseases."

CLASSIFICATION OF VITAMINS

The vitamins known at the present time, as far as they have been isolated, may be classified or grouped as follows; and in accordance with the report of a committee appointed a few years ago by the Lister Institute. The findings of this committee are of great interest. At the end of the report a valuable table is given, showing the distribution of the three vitamins in the commoner foodstuffs. In the absence of quantitative data it was impossible for the committee to do more than indicate the relative values of the foodstuffs as sources of the various vitamins. The table, with slight modifications, follows:

Classes of Foodstuff	Fat-soluble A or anti-rachitic factor	Water-soluble B or anti-neuritic (anti-beriberi) factor	Water-soluble C, or anti-scorbutic factor
Fats and Oils:			
Butter	+++		
Cream	++		
Cod liver oil	+++		
Mutton fat	++		
Beef fat or suet	++		
Peanut oil	+		
Fish oil, whale oil, etc.	++		
Margarin prepared from animal fat	Value in proportion to amount of animal fat contained.		
Nut butters	+		
Meat, Fish, etc.:			
Lean meat (beef mutton, etc.)	+	+	+
Liver	++	++	+
Kidneys	++	+	
Heart	++	+	
Brain	+	++	
Sweetbreads	+	++	
Fish, white		Very slight if any	
Fish, fat (salmon, herring, etc.)	++	Very slight if any	
Fish roe	+	++	
Canned meats	?	Very slight	
Milk, Cheese, etc.:			
Milk, cow's whole, raw	++	+	+
Milk, skim, raw		+	+
Milk, dried whole	less than ++	+	less than +
Milk, boiled whole	undetermined	+	less than +
Milk, condensed, sweetened	+	+	less than +
Cheese, whole milk	+		
Eggs:			
Fresh	++	+++	?
Dried	++	+++	?
Cereals, Pulses, etc.:			
Wheat, maize, rice, whole grain	+	+	
Wheat germ	++	+++	
Wheat, maize, bran		++	
Linseed, millet	++	++	
Dried peas, lentils, etc.		++	
Soy beans, haricot beans	+	++	
Germinated pulses or cereals	+	++	++

Classes of Foodstuff	Fat-soluble A or anti-rachitic factor	Water-soluble B or anti-neuritic (anti-beriberi) factor	Water-soluble C, or anti-scorbutic factor
Vegetables and Fruits:			
Cabbage, fresh (raw)	++	+	+++
Cabbage, fresh (cooked)		+	+
Cabbage, dried	+	+	Very slight
Cabbage, canned			Very slight
Swede (rutabaga), raw expressed juice			+++
Lettuce	++	+	
Spinach (dried)	++	+	
Carrots, fresh raw	+	+	+
Carrots, dried	Very slight		
Beetroot, raw, expressed juice			less than +
Potatoes, raw	+	+	
Potatoes, cooked			+
Beans, fresh, scarlet runners, raw			++
Onions, cooked			+ at least
Lemon juice, fresh			+++
Lemon juice, preserved			++
Lime juice, fresh			++
Lime juice, preserved			Very slight
Orange juice, fresh			+++
Raspberries			++
Apples			+
Bananas	+	+	+
Tomatoes (canned)			++
Nuts	+	++	
Miscellaneous:			
Yeast, dried		+++	
Yeast, extract and autolysed	?	+++	
Malt extract		+ in some specimens	

Explanation of symbols used in table:
+ means small amount present. ++ moderate amount present.
+++ large amount present.

None of the three factors was found in: Lard; olive, cottonseed, coconut, or linseed oils; coco butter; hardened fats, animal or vegetable in origin; margarin from vegetable fats or lard; cheese from skim milk; polished rice, white wheaten flour, pure corn flour, etc.; custard powders, and egg substitutes, prepared from cereal products; meat extract, and beer.

A study of this valuable table will show the progressive housewife just what foods contain the different groups of vitamins, and will serve to indicate when the family dietary is

running low in its content of these indispensable accessory food substances.

The diseases which are believed to be directly caused by the absence of vitamins, and which are now known to be prevented by eating those foods which contain the proper vitamins, are rickets, beriberi, scurvy, neuritis, certain skin diseases, and probably pellagra. Aside from their influence in producing certain definite diseases, such as those just mentioned, the absence of vitamins, or a deficiency of those substances, in the food undoubtedly serves as a contributing factor in the causation of many other nervous, nutritional, and obscure human diseases.

THE ECONOMIC ASPECTS OF VITAMINS

This recent knowledge regarding vitamins makes it imperative that good, fresh milk should be deemed one of the absolute necessities of life for infants and growing children.

There is danger in the American tendency to eat so much meat and so many sweets, and thus, with a large consumption of cereals, to subsist on a diet that is deficient in vitamins.

A study of the dietetic practices of the average American suggests that, on the whole, his intake of vitamins is dangerously low. Particularly is this true of certain types of vitamins. It is unfortunate that our dairy products have gone up so in price in recent years. This has led to the use of less butter, and has increased the sale of the "margarin" type of fats, which the best authorities claim—as prepared at present —do not contain as high a percentage of the vitamin "A" as butter, though we are informed that the manufacturers of these products are endeavoring to remedy this deficiency.

Vitamins are very unstable substances, that is, they easily break up into their component parts, and thus it is very difficult to preserve them, or even to isolate them; so that it will be some time before we can expect to have vitamins given us in the form of capsules or tablets, though an enterprising commercial Yankee has already begun to serve up so-called "vitamin" tablets which can be had at so much per dozen, with all the glowing promises and testimonials which characterized the patent medicine vender in the heyday of his prosperity.

It is not necessary that we should have vitamins artificially put up or handed out to us in concentrated form. They are

present in many common, everyday foods—foods which are acceptable to the ordinary individual, and if they cannot be had in one food they can be had in varying quantities in some other common foods. Practically all the foods we eat contain vitamins of certain sorts, while certain foods are especially rich in these important food substances, as will be seen by consulting the tables herewith presented.

THE VITAMIN SUPPLY

It is now believed that the vitamins are to some extent destroyed by drying and also by cooking, particularly in the presence of soda. Probably no two foods are affected to the same extent, and even if the effect on every food were known, the facts would be difficult to keep in mind. In the absence of definite available knowledge on this subject it is wise for the housekeeper to use regularly some uncooked fruits or tomatoes, fresh or canned, and some green leaf vegetables. The last mentioned should be used either raw or cooked only enough to make them taste good and without unnecessary loss of their juices. Canned and dried vegetables and fruits may all be used for the sake of economy or convenience to give bulk to the diet, but never to the exclusion of green leaf vegetables and fresh fruits.

There is no way at present of measuring the exact amount of fruit juices needed for health. It seems probable, however, that it is not large, and the housekeeper who cannot afford to serve whole oranges, grapefruit, or fresh tomatoes is probably on the safe side if she makes a practice of introducing small amounts of tomato, orange, or lemon juices into her bills of fare. An orange cut up with other fruits or a little lemon juice added to sliced bananas, stewed prunes, or other fresh or dried fruits, is helpful. There are many desserts and beverages, too, in which small amounts of orange or lemon juice can be used, and many gravies, sauces, and soups that are improved by a little tomato juice. Regularity of supply is probably more important than the use of large amounts.

Normally fresh, unheated milk contains, according to Osborne and Mendel, all the vitamins necessary for growth and health. Some of these vitamins are destroyed by pasteurization, and perhaps all are destroyed by boiling.

Osborne and Mendel found that phosphates deposit in the

urine of animals if they are not fed a sufficient amount of fat-soluble vitamins.

Most so-called infant foods do not contain much vitamins, as these occur in the outer husk or shell of cereals and are largely lost by milling; hence the higher refined the flour, the less vitamins it contains. Too finely milled corn and barley have also lost their vitamins. Barley contains a water-soluble vitamin, and Osborne and Mendel have found that the soy bean contains both water-soluble and fat-soluble vitamins. Besides being of high protein value, the soy bean also contains a large amount of oil, hence this legume is a very valuable food.

It should be remembered that the influence of heat in destroying vitamins is dependent not only on the varying degrees of the heat itself, but also on the amount of oxygen present, as was so clearly shown by the experiments reported by the Nutrition Committee of the American Public Health Association.

CHAPTER XX

THE PREVENTION OF NUTRITIONAL DISORDERS

Metabolism consists in an up-building and a tearing-down process. After the food is all digested, absorbed, and assimilated, having become a part of the body, then begins the work of tearing it down—of liberating its heat and energy—to be followed by its elimination from the body. The carbohydrates (starches and sugars), together with the fats, are completely burned up in the body and are then eliminated in the form of water and carbonic acid gas (CO_2). The proteins, or nitrogenous foods, are not so completely burned in the body. The ashes which result from their combustion are not simple substances like the water and CO_2 of the carbohydrates. On the other hand, the protein ash is represented by a number of complicated substances, some of which are solid. When these protein clinkers accumulate in the body, they aid in causing many diseases, such as gout, headache, biliousness, etc.

These protein ashes and clinkers are further acted upon by the liver—split up and sifted—and are finally eliminated by the kidneys in the form of urea, uric acid, etc. The body is unable to store up proteins. When one eats more of this substance than is daily required to replenish the waste of the body, it must be immediately split up in the system, and its irritating ashes carried off by the eliminating organs. The overeating of sugars, starches, or fats is not such a serious matter, as they may be stored in the liver and subsequently used; and even if they are eaten in excess of what the liver can care for, they accumulate as fat or add extra fuel to the fires of the body, their ashes being carried off in the form of such harmless substances as water and carbon dioxid (CO_2).

The average human body produces enough heat every hour to raise two and one-half pounds of water from the freezing point to the boiling point. This is equivalent to boiling about seven gallons of ice-water every twenty-four hours. Differ-

ently expressed, the body gives off each hour the same amount of heat as a foot and a half of two-inch steam coil. This is the same amount of heat which would be produced by burning about two-thirds of a pound of coal. The body consumes itself at the rate of one-eightieth of its weight every twenty-four hours.

Expressed in terms of English weight, the fuel value of the three different food elements (water-free) would be:

1 ounce of Carbohydrates	127.5 Calories
1 ounce of Proteins	127.5 Calories
1 ounce of Fat	289.2 Calories

The term calorie, so frequently used in expressing the fuel value of foods, signifies the amount of heat required to raise one kilogram of water one degree centigrade.

BERIBERI

In the outer covering or husk of rice or other cereals there is a vitamin that is essential to the health of the nerves. In other words, if we feed human beings largely on polished rice or white rice, they will soon show symptoms of beriberi. When they are fed on unpolished or red rice they will not have the disease. In experiments made at the insane asylum at Singapore where half the population at one time died of beriberi, it was found that the disease could be promptly arrested or cured by feeding these unfortunates on unpolished or red rice.

It was once thought that deficiency in phosphorous had something to do with causing this disease. When rice contains less than 4/10 of 1 per cent of phosphorous, beriberi will appear, that is, provided rice is the chief article of diet. In the case of the average person in this country who partakes of a liberal mixed diet in which rice is only an occasional article, it makes little difference whether the rice is polished or not. We get our phosphates from other sources; but this is only one step in the working out of the cause and prevention of beriberi, as it is now known that the disease is prevented by substances other than phosporous—by *vitamins.* It is interesting to note in this connection that it was Funk's discovery of this vitamin in rice that led to the opening up of the whole subject of these so-called "accessory food substances" in the last decade.

We should look with suspicion upon all cereals which have had the husk and the germ removed.

Symptoms. Beriberi requires many weeks to develop and

may last for months. The death rate is very high, running up to 50 per cent. The heart, as well as the nerves are affected, and there is often an associated dropsy. The nerves are very painful and tender. The disease manifests itself in several different forms but death usually comes from heart failure. Among the early symptoms are weariness, stiffness, shortness of breath, nausea, vomiting, diarrhea, together with numerous nerve sensations, such as pain, numbness and tingling. The muscles of the calf of the leg are very tender. In one form of the disease the muscles swell, and in another they waste away.

Prevention. The disease can be prevented by the substitution of unpolished cereals for the highly milled white rice, white bread, etc., as shown in the Philippine experiments where the United States Army officials made this change in the diet of the native scout forces; and concretely illustrated in the case of a leper colony where, in 1910, there were 309 deaths from beriberi, but after changing the diet from polished to unpolished rice, not a single case of the disease developed the following year.

SCURVY

Scurvy is a disease that has in times past appeared in armies, in cities during military sieges, in mining camps, and in other places where the diet was deficient in fresh meat, fresh fruit, milk and vegetables.

Scurvy is due to deficiency of vitamin C. Cooking, heating and drying processes—so commonly employed in preserved and manufactured foods—largely destroy this substance and therefore a diet consisting entirely of such articles of food tends to produce scurvy. The foods which are especially valuable in the prevention of this disease are fresh meat, green onions, potatoes, cabbage, carrots, dandelions, milk and orange juice.

It is not necessary to boil milk to harm this vitamin, even heating it to 145° F. (pasteurization) will largely destroy this vitamin; and that is why infants fed on pasteurized milk must have orange juice daily in order to supply this scurvy-preventing vitamin. Infants fed on boiled milk and patent infant foods are almost sure to develop this disease in some form.

Lime juice will not lose its vitamins by boiling or by any other treatment, and that is why it becomes the sovereign

remedy to use on shipboard. It is more tenacious in its hold on the vitamin than any other known food.

This water soluble vitamin C is found in the majority of raw fruits and vegetables, but especially in oranges, limes, lemons and tomatoes.

Symptoms. When scurvy appears in babies it is first shown by a tendency of the infant to cry on being moved. Pain seems to be chiefly in the legs and sometimes it is thought that these infants have rheumatism or abdominal trouble since they have a tendency to lie with the legs drawn up. Presently the limbs swell. The toes tend to point outward. The gums swell and bleed easily. Purple spots appear on the skin. Sometimes there is blood in the urine and bowel discharges; in fact, there is a general tendency to hemorrhage—internally and externally under the skin. In severe cases of scurvy in infants, the ends of the bones sometimes snap off without apparent cause.

In adults scurvy manifests itself by pallor, weakness and emaciation. The gums swell, become soft and bleed easily. The teeth loosen. Hemorrhagic purple spots appear under the skin. The ankles swell, and ulcers often develop on the legs. There is headache, palpitation of the heart, and in advanced cases, delirium.

Prevention. We seldom have scurvy in this country nowadays except in children who are, as already noted, fed on sterilized milk or artificial foods. It can be prevented in all cases by giving the infant, after the first month or six weeks, two teaspoonfuls of orange juice daily. Even if scurvy has started, such treatment will, within a few days, cure the disease.

In adults all that is needed to prevent or cure the disease is fresh meat, fresh fruit, vegetables or lime juice, orange juice—all fresh juices of those foods containing water soluble vitamin C.

RICKETS

It would be a surprise to many mothers to know that more than 50 per cent of babies have rickets, between the ages of three months and two years, in the poorer classes of our large cities. Many children have had a touch of rickets without it being recognized. It also occurs in those children who are fed on condensed milk, or proprietary foods, or boiled cow's

milk. In fact, babies that are fed on milk alone, even mother's milk, after a year of age, may sometimes show rickety tendencies.

Rickets is probably not a vitamin deficiency disease, though it is thought to be favored by deficiency of fat soluble vitamin A.

Cod liver oil is a sovereign remedy for the prevention and cure of rickets. More recently rickets has also been shown to be favorably influenced by special light treatments. It is quite likely that rickets is due to a combination of causes, bad hygiene, improper food, lack of sunshine and fresh air, and it is highly probable that deficiency of lime—calcium—is a factor in the causation of rickets.

Symptoms. Rickets is not so easy to recognize. Among the early symptoms there is characteristic pallor and puniness, with muscle flabbiness. The infant seems to be sore and sensitive when handled. There is often a slight fever. The head seems to be too large for the body and face. Teething is delayed. The soft spot on the top of the skull does not close, even though the child is three or four years of age. The baby has frequent colds, does not sleep well, and sweats unduly about the head and neck, especially at night. The chest begins to show deformity, becoming pigeon breasted, and the spine may be bowed. There often appears a vertical row of little beads or knobs on the ribs on either side of the breast bone. The child has a tendency to become pot-bellied, bow-legged, or knock-kneed. Convulsions are common.

Prevention. The first thing in the prevention of rickets is to get a well balanced diet, since the disease never appears in breast fed children. If the cows' milk can be properly modified so that the child gets proper amounts of protein, sugar, and fat, the disease will not develop. To be on the safe side of the vitamin question, give a few spoonfuls of orange juice daily.

If the infant is one year of age, it must have fresh foods, particularly fats, cream, butter, and if the disease is suspected or appears, pure cod liver oil, which should be given in doses of ten to thirty drops in a child around one year of age up to a teaspoonful three times a day after meals, in children two years or more of age.

These children should be given salt baths at night, with the water at a temperature of 95° F.—a level teaspoonful of salt

to the gallon of water. Some authorities recommend following this bath to rub two teaspoonfuls of cocoa butter into the skin for ten or fifteen minutes.

Treatment. Recent experiments made at the University of Wisconsin show that sunlight—direct sunlight—is the one essential factor in the treatment of rickets. Even the interposition of glass interferes with the ability of the sunlight to cure rickets; the animal or the human being to be treated must be exposed to the direct rays of the sunlight.

It is interesting in this connection to note that when an animal has been exposed to the sunlight it is not only benefited itself, but it seems to gather up something from the sunlight which it can radiate to other animals. For if one animal suffering from rickets is put out in the sunlight and then put back in the cage with other rickety animals, it is found that the animals which have not been exposed to the sunlight are almost equally benefited.

Another singular thing discovered in these experiments is that ordinary foods which are not supposed to be curative of rickets are beneficial in this disorder when they are exposed for a while to the direct rays of sunshine before they are eaten. For instance, cod liver oil is the sovereign remedy for rickets, but now it is found that ordinary butter and other forms of fat, as well as other food substances, are equally efficacious in the treatment of rickets if they are first exposed to the sunlight.

And it is for this reason that the ultra violet rays and other forms of open arc light have been found beneficial in the treatment of rickets. These forms of light are, to all practical intents and purposes, the same as sunlight when employed as therapeutic measures.

Whatever may be the dietetic treatment of rickets, we must not overlook the fact that sunshine is the essential factor.

PELLAGRA

One hundred and fifty years ago this serious disorder was noted in Spain, France and Italy, but only in the last twenty-five years has the disease been recognized in the United States. It is a condition which manifests itself in many forms. It first appears in the skin, then affects the digestive system, and later the mind and nervous system. It appears more often in persons between the ages of twenty and forty.

Pellagra is not contagious and it has been shown that it is not a disease conveyed by flies; but that it is due to trouble in the diet. At one time it was thought that Indian corn had something to do with the cause of the disease but it is now thought to be due to the eating of too much starch. That is, to lack of vitamins A and B and to deficiency in protein. It occurs in the United States mostly in the southern portion during the winter time. It has been clearly shown that proper amounts of meat, eggs, milk and fresh or even dried peas and beans will prevent the disease, and will cure it except when too far advanced.

Symptoms. The patient at first experiences a feeling of weakness and depression; has persistent headaches; the digestion fails; there is soreness in the mouth with swelling and redness of the tongue; nausea and vomiting. There is a painful, watery or bloody diarrhea. The skin on the back, face and neck becomes red and puffy, looking very much like it was badly sunburned, and later peels off as in the case of sunburn. In some cases blisters form. The nervous symptoms include, in addition to headache and dizziness, marked mental depression, irritability, with gradually failing mental powers, sometimes accompanied by hallucinations.

In severe cases there may be considerable fever and stupor with delirium, and death may occur in a few weeks. Chronic cases recur in spring and fall from year to year, with gradual failing mentality so that the patient gravitates toward the insane asylum.

Prevention. A winter diet consisting of six glasses of milk, four eggs, one-half pound of lean meat, with dried peas or beans, or bean soup, will serve to cure the majority of cases, and the diet will be improved if, in addition to the foregoing, some fresh fruits, potatoes, onions and oatmeal are added. It is advised that such patients do not use corn, as it seems, for some reason, not to be the ideal food for pellagra victims.

Recent feeding experiments by the United States Public Health Service, upon prisoners at Jackson, Miss., has finally settled this question of pellagra, since they fed potatoes, molasses and sugar to eleven prisoners for six months and six contracted pellagra. Twenty men in the same prison who were properly fed showed no pellagra. However, in spite of all this, there are still those who claim that pellagra is a germ caused disease, and in the end it might prove that there is a

microbe involved which can only attack persons who are predisposed by being fed on an improper diet.

ADOLESCENT GOITER

It is believed nowadays that the goiter which appears in boys and girls, particularly girls at the time of puberty, is due to deficiency of iodin in the food and drinking water. This condition is six times more prevalent in girls than in boys. Sometimes it is merely a passing event associated with adolescense. At other times it does not disappear. Around the region of the Great Lakes and the Pacific Northwest, goiter is sometimes found in fifty per cent of girls attending high schools and colleges.

It has been found that if school children are given small doses of sodium iodid, that is, to give them two grains of this substance each day for two weeks every six months, that it prevents 99 per cent of this goiter, and that over 50 per cent of the children who already have the goiter will be cured by this treatment.

In any individual case iodin should not be given to a youth without medical advice and without having the metabolism test made. That is, we have a machine nowadays which, by analyzing the air coming out from the lungs, will give a very reliable indication as to whether or not the thyroid gland is in need of assistance. In this way a general idea is had as to how much, if iodin is required, should be administered.

Another theory is that in some sections of the country there may be infection in the water which gets into the bowel and in some way is able to use up the iodin in the food and thus prevent it ever getting into the blood stream. This theory has been assisted by the fact that it has been found that boiling water sometimes tends to prevent goiter and that matter filtered out of water seems to have a tendency to cause goiter when fed to human beings.

Persons who live near the seashore or who eat fish from salt water seem rarely to develop goiter. Land which has been most recently submerged by sea water produces vegetables containing a large amount of iodin and therefore they tend to prevent goiter. That is probably why we have so little goiter in the southern part of the United States and more in the country where the glaciers have scraped away all of the soil containing iodin from former marine submergences.

OBESITY

It is impossible in a work of this sort to go thoroughly into the question of obesity, how to reduce weight, etc. Attention here may be called to the fact that obesity is due to three factors:

1. Deficient thyroid secretion and in special cases, pituitary, which tends to cause certain individuals and even whole families to accumulate flesh, sometimes in general, and sometimes about particular parts of the body, as the hips, abdomen, etc.
2. Habitual overeating.
3. Deficient exercise.

Any system of reducing exercises which does not take into consideration the regulation of the diet is doomed to failure. Diet is the keynote of success in reducing weight. Now in certain rare cases where the thyroid or the pituitary are involved, patients may be assisted in their reducing régimé by taking the extracts of these glands derived from the lower animals; but under no circumstances should the layman ever take thyroid for reducing purposes without a physician's advice. These dangerous and powerful glandular ingredients should only be administered under medical supervision.

The accompanying table compiled by the insurance companies, will serve to show what the average weight should be at various heights and ages. That is showing the limitations or minimum and maximum weight.

Height	Ages				
	15-29	30-34	35-39	40-49	56-60
5 ft.	117	114	110	106	103
	154	152	148	146	143
5 ft. 1 in.	118	116	111	108	104
	156	155	151	149	145
5 ft. 2 in.	120	118	113	110	106
	159	157	153	151	147
5 ft. 3 in.	123	121	116	112	108
	162	161	156	154	151
5 ft. 4 in.	126	123	119	114	110
	166	164	161	157	154
5 ft. 5 in.	130	127	122	118	113
	171	169	166	162	158
5 ft. 6 in.	133	131	126	121	116
	176	174	170	166	162
5 ft. 7 in.	137	134	129	124	120
	181	179	175	171	167
5 ft. 8 in.	141	139	133	128	124
	186	185	181	176	173

Height	Ages 15-29	30-34	35-39	40-49	56-60
5 ft. 9 in.	145	142	138	132	128
	191	190	186	182	178
5 ft. 10 in.	149	147	142	136	131
	196	196	192	187	183
5 ft. 11 in.	153	151	146	141	135
	202	202	198	194	189
6 ft.	159	157	150	146	140
	210	209	205	200	195
6 ft. 1 in.	165	162	156	151	145
	217	216	212	210	202
6 ft. 2 in.	170	167	162	157	150
	224	223	220	216	210
6 ft. 3 in.	176	173	167	162	155
	232	230	227	223	217

Overweight is especially dangerous after one is forty years of age. Underweight is looked upon with disfavor in young people as it predisposes to tuberculosis. Fat people after they are forty tend to have more trouble with bronchitis, constipation, hemorrhoids, diabetes, gout, stone in the kidneys, and Bright's disease, not to mention gall-stones. Hardening of the arteries and apoplexy are more common in obese people.

This work is not devoted to treatment; but since obesity is prevented by regulation of the diet and proper exercise, the following simple suggestions will be given which will be found valuable in reducing in the average case. Those who are interested in following this matter further are referred to the author's book dealing more fully with this subject.[1]

1. *Daily ration.* Cut your usual daily ration down to at least one-half. Obesity patients should limit their diet to about 800 or 1,000 calories a day.

2. *Monotonous diet.* Restrict the diet to two or three articles.

3. *Fats and sugars.* Avoid all fatty, fried and sweetened foods, including candies and sugars.

4. *Starches.* Avoid all starchy foods—breads, cereals, pastries and desserts.

5. *Liquids.* Partake sparingly of liquid foods, but do not restrict the water intake too much.

6. *General diet.* Select the diet from the following: Buttermilk, hard breads, eggs, lean meats, vegetables, broths, sour apples and sour fruits, lemons, celery, tomatoes and greens.

7. *Suggestive reducing diet.* This diet is for the systematic

[1] "How to Reduce and How to Gain," A. C. McClurg & Co.

treatment of obesity and should be continued not longer than two months.

Breakfast. One glass of lemonade (without sugar) or one cup of coffee (no cream and one teaspoonful sugar).

Lunch. Fresh fruits; varieties allowed, one only. Apples, peaches, oranges, grapefruit, strawberries, raspberries, blueberries (no sugar). All the salad you wish (without dressing of any kind)—only salt is allowed.

Dinner. Clear soup or broth (small serving). Abundant green vegetables, prepared without butter, oil or milk. Those allowed are spinach, onions, string beans, lettuce, celery, cresses, white cabbage, asparagus, cauliflower, tomatoes and radishes. One or two glasses of lemonade (without sugar), or one glass of buttermilk, or one glass of skimmed milk. Three ounces of lean beef, mutton or lamb, and one slice of bran bread. Sour pickles.

DIABETES

Diabetes is a disease characterized by the presence of sugar in the urine. It is a disease in which the liver and pancreas, particularly the latter, are concerned. The pancreatic gland secretes a substance which enables the body to burn sugar and when this substance is diminished, this sugar has a tendency to accumulate in the blood, the kidneys assuming the task of eliminating it from the body in the urine.

While diabetes may be due to a primary disease in the pancreatic gland, it is nowadays believed that it is predisposed by obesity. The disease seems to run in families and in races, as is the case of the Jewish people. The most important item in the prevention of diabetes is to avoid obesity, especially to avoid overeating starches and sugars.

Diabetes is especially fatal when it occurs in young persons, and diabetic parents should take particular care to see that the child does not overeat, especially candy, cake and rich desserts. The urine should be tested every three months in the case of all children of diabetic parents, in the case of all diabetetics over thirty-five, and in the case of any person who knows they have ever had sugar in the urine.

The management of diabetes has been wonderfully improved in the last ten years, and still more recently many cases, particularly young persons, are wonderfully helped by the use of a new remedy called insulin. However valuable this lat-

ter treatment, it does not take the place of regulation of the diet.

FOOD POISONING

When it comes to the question of spreading mischief by means of food, milk is the first thing that claims attention and the whole subject can be summed up by simply saying—*pasteurize the milk.* Practically all disease germs are thus destroyed and only one harm is done—the vitamins are killed, but this is not serious except in the case of infants who have been deprived of breast milk and who must depend upon cow's milk for their daily food; but in this case any harm done the milk by pasteurization can be immediately counteracted by giving the baby a spoonful of orange juice each day.

In the past, the chief source of infant mortality has been diarrheal diseases in the summer due to infected milk—milk contaminated with manure microbes. We must not overlook the fact also that tuberculosis is secured in the majority of cases from infected cows and that it begins its mischief very early in life, in most cases having entered the child's body along with its daily milk supply. Other diseases spread by unpasteurized milk are diphtheria, typhoid fever, and scarlet fever, together with septic sore throat.

1. *Ice cream* is a common source of food poisoning, especially when it is old, when it has been stored some time before being eaten. Freezing milk does not destroy the microbes; they will remain active indefinitely even at a zero temperature. It is a bad practice to allow children to eat ice cream indiscriminately bought in public places in the form of the modern ice cream cone.

Milk products, including ice cream and cheese, are particularly subject to the action of dangerous bacteria, and when these substances are spoiled they produce, by means of their toxins, severe attacks of vomiting, colic, diarrhea, with great prostration, with affection of the heart, and sometimes the results of such attacks are fatal.

2. *Ptomain poisoning.* Not all cases of food poisoning are ptomain poisoning. Ptomains are a group of alkaloidal poisons formed in the process of food putrefaction, particularly meat and sometimes vegetables. It is a very rare condition. Most cases which have been diagnosed ptomain poisoning are simply attacks of indigestion or ordinary food poisoning.

Tainted meats are far more dangerous when used as compared with spoiled vegetable foods. It is surprising that we do not have more trouble from meat eating in this country as only half of the animals slaughtered in the United States come within the jurisdiction of Federal inspection. This is why it is unwise to eat rare or raw meats. Not only from the danger of parasites which they may contain, such as trichina and tapeworm, but also from the fact that the animal itself may be diseased, and thorough cooking of the meat will do much to protect the eater against serious consequences.

It is difficult sometimes to know whether meat is really fresh or not in these days when so much of our flesh foods are cold storage products. Great care should be exercised when canned meats are used for foods, to observe the can before opening, to see that the ends do not bulge, and to see that the product is in every way untainted, before it is used for food.

In recent years, we have had many cases of sausage poisoning—botulism. This is a severe disorder and the death rate is above 50 per cent. Efforts are being made now to develop an antitoxin to use in these cases.

We should be particularly careful about using shell fish and other sea foods, as such food is always more or less tainted after being out of water twenty-four hours or more.

3. *Vegetable and fruit poisoning.* Most of the trouble with green vegetables and fresh fruits is that they cause trouble because of the result of coming in contact with manure microbes in the orchard or fields, or from the dust blowing about and settling upon these articles. In this way they become contaminated so that they produce dysentery or diarrheal attacks, which are blamed on the food substances when in reality the trouble is all brought about by the germs which attach themselves to the fruit or vegetables. Fresh fruits or vegetables when thoroughly washed and cleaned, or in the case of fruits, pared before they are eaten, will not produce these attacks of cholera morbus or dysentery. It requires great pains to clean lettuce and celery so as to make it fit for use as a raw food.

It will not be in place to go into the subject of mushrooms here except to warn persons not to partake of these articles of food unless they know they have passed the scrutiny of some

reliable person or that they have come from some trustworthy source.

Potatoes belong to a family of poisonous plants, plants containing belladonna and other poisonous substances, but they are never able to produce any symptoms when used for food, except in the case of potatoes that have begun to sprout. They are then poisonous. Sometimes in the case of young potatoes growing uncovered by the earth this poison is also found.

In the case of other fruits and vegetables, the mischief they produce is due to individual idiosyncrasies. It is a case of *allergy,* already referred to, and it consists in the susceptible individual breaking out with hives or nettle rash as the result of eating these foods, as in the case of strawberries, buckwheat cakes, honey, etc.

CHAPTER XXI

CAUSES AND PREVENTION OF CONSTIPATION

The causes of constipation are numerous. For purposes of discussion in this chapter, we have put the causes of intestinal stasis into a dozen groups. We can never hope for success in the treatment or prevention of any disease until we come to understand the causes which are responsible for the manifestation of the disorder.

We must not overlook the fact that in many cases of intestinal stasis the patient may have one or two regular bowel movements every day and therefore would hardly regard himself as a victim of constipation; but the physician recognizes all these cases of intestinal stasis as constipation, if the food mass remains anywhere from twenty-four to forty-eight hours too long in the bowel, before it is finally eliminated. Of course, we may have both conditions present—intestinal stasis, long retention of feces, and infrequent movement of the bowels—constipation.

It will be readily seen that in the case of some persons who eat food of too little bulk that there must occur an accumulation of food residue of twenty-four to forty-eight hours before sufficient bulk is present in the lower portion of the large bowel to stimulate active peristaltic movements. This is the reason why some persons only have a good bowel evacuation every other day.

CAUSES OF CONSTIPATION

1. *Heredity.* There is no doubt whatever that habitual constipation may be of hereditary origin. We observe that constipation habitually manifests itself in certain families. Individuals belonging to those families who tend to be subthyroid, who are inclined toward obesity, are notoriously constipated. Anything in one's heredity which predisposes either to nervousness or a disturbance of the ductless gland system,

may indirectly contribute to those influences which make for stasis and constipation.

2. *Age.* There are certain ages which show a predisposition to constipation of various sorts. It is well known that infants are peculiarly subject to constipation when bottle-fed. Habitual constipation is also frequently met with at puberty. Finally we come to the tendency toward constipation which so often attends old age. In most of these cases, however, in addition to advanced years, there is usually a history of preexistent constipation. That this condition should become worse with the increase of years, and with the restriction of food intake and of exercise, is not surprising.

3. *Sex.* In the absence of reliable statistics, I would venture the guess that about three or four women suffer from constipation as compared with one man. This being so, we naturally look to those conditions which are associated with the female sex to throw some light upon the causes of constipation. Such conditions are corsets, faulty breathing, and muscular inactivity; and these are very generally accompanied by a certain tendency to disregard the calls of Nature, due to modesty or lack of suitable opportunity. Certain conditions following repeated pregnancies are also concerned in predisposing to constipation.

4. *Muscular activity.* A sedentary life or insufficient physical exercise is commonly considered as the chief cause of habitual constipation. I no longer entertain this view. I have seen some of the most active individuals suffer inordinately from constipation; while some thoroughly sedentary and inactive persons enjoy normal and free bowel elimination. Great activity of the muscles of the arms and legs alone by no means prevents intestinal sluggishness.

It is also worth while pointing out to patients that the sitting posture assumed by civilized man while at stool is far less calculated to aid in defecation than the crouching or squatting attitude of primeval or agricultural man. By the aid of a footstool the latter position may be imitated with considerable success.

5. *Habitual neglect.* A disregard of the calls of Nature is common in some men—in those, for example, upon whom business exigencies impose irregularity of hours. It is highly important to go to stool at the same hour every day. If the calls of Nature are habitually ignored sooner or later the urge

will fail entirely of recognition, the fecal mass will remain unrecognized in the rectum. We know that failure to arise promptly when the alarm clock rings will soon produce such a state of affairs that the sluggard can sleep on peacefully while the alarm rings noisily at his bedside.

6. *Irregular habits.* A large class of sufferers from chronic constipation is made up of those unfortunate individuals who are condemned to restaurant living. They eat irregularly, gulp down their meals, often with a newspaper propped up before their eyes. Too often the food consists of meat, fish, cereals, and other highly concentrated foods—foods almost wholly lacking in that important element of bulk, and this fact, coupled with the irregularity of eating, seems to lay the foundation for serious intestinal inactivity.

7. *Displacement* of the digestive and other organs is common in people with flabby abdomens, in those who take little or no exercise. It is present in convalescence, in anemia, and in other debilitated states and disorders.

Among the causes of enteroptosis, outside of hereditary tendencies, are errors in dress, corsets, belts, etc., overwork, nervous exhaustion, debility from any cause, attitude during work, sitting, etc.; while peritoneal adhesions are responsible for many of these cases.

In many of these cases, I am inclined to the belief that it is more a matter of lowered nerve tone than prolapsed organs. So many times we find the abdominal organs all tumbled down in the basement, as it were, and yet the patient suffers not at all from constipation. The nervous condition has more to do with these things than the position of the stomach and colon.

8. *Anxiety,* fear, anger, worry over business matters, and what we describe to-day as neurasthenia or psychasthenia of all degrees up to nervous breakdown, are factors in producing constipation in many neurotic men and women.

While psychic excitement may exert a powerful influence on bowel activity—not only in a retarding but also in the production of anxiety diarrhea—it would probably be going too far to say that every subject of constipation was first a neurasthenic. It is a fact, however, that most victims of stasis are also more or less neurotic. On the other hand, the reverse is often the case; the subject of chronic constipation suffers so intensely from the effects of chronic self-poisoning that the depleted nerve centers are unable to recuperate their energy.

Constipation and nerves constitute a familiar "vicious circle" —each malady only serving to aggravate and accentuate the other.

9. *Cathartics.* It is one of the crimes of the age that the majority of individuals must rely on laxative drugs to produce a daily movement of the bowels. Let us not forget that the principal causes of constipation are lack of regularity in going to stool; insufficient amount of water drunk; too refined or too concentrated foods; and an insufficient amount of walking or other simple physical exercise.

Cathartics serve to bring about intestinal stasis much as do the presence of the toxins of chronic fermentation or autointoxication. The bowel is exhausted from overwork; excessive secretion is followed by a reaction of undersecretion. Cathartics produce congestion from which there is always an undesirable reaction. This is why cathartics end by wearing out, so that it requires enormous doses or a stronger purgative to get any reaction from the bowel.

10. *Diet.* Every healthy person should have one, or better, two free bowel movements each day. If but little is eaten, and especially if that little leaves a small residuum to be passed on to the colon, a normal movement of the bowels once every other day may be perfectly natural and no harm seems to result in some cases.

Concentrated food. Sometimes the character of the food is such that little residue is left to pass on to the colon—it has all been absorbed in the digestive process. Under these circumstances there is likely to be constipation, since there is little left in the bowel to provoke peristaltic activity.

One thing is certain, some persons can live upon a more concentrated diet without constipation than can others. Individuals vary in this respect. Some people will suffer constipation as a result of eating cheese with a meal; others will not.

Meat. It is commonly believed that an excessive amount of meat in the diet—not only because of its failure to provide bulk, but also because of its tendency toward intestinal putrefaction and consequently poisoning of the bowel muscles—in these and other ways, contributes to the acquirement of habitual constipation. Even milk is thought by some persons to be constipating. Eggs are constipating to most individuals.

Cereals. The highly milled cereals, flours, breakfast foods, etc., are all more or less constipating to the average individual.

Fine flour bread, pastries and other cereal dishes made from the grain after all of the outer layers of bran have been removed are responsible for much of our constipation. And this is just why it has become necessary for so many persons regularly to eat bran with their meals. We add bran to our cereals and breakfast foods because we should not have removed it in the first place.

Fluids in the bowel. We not only fail to supply bulk in the diet, but we also fail to supply sufficient water. You can partake of too little water, thus causing the intestinal contents to be absorbed; and this results in a drying up of the food residue so that certain constipation follows. It must be remembered that about 70 per cent of the actual normal stool is water; the largest portion of which is excreted by the intestinal glands, but if insufficient water is supplied the system, these glands will not be able to contribute their normal secretion of liquids to the bowel contents.

Muscular inactivity, though not in the sense in which the term is generally used, is a very common cause of constipation. On the other hand, general muscular activity, so far from preventing constipation, may favor its occurrence, especially if insufficient fluids are consumed; it is the muscular activity local to the abdominal organs which is so important in preventing constipation. In case of general muscular activities accompanied by profuse perspiration, constipation may be favored, unless abundance of liquids are drunk to replace the fluids lost by perspiration.

Agar-agar is a laxative of value because it absorbs and retains water, and this causes the feces to be softer and therefore more easy of passage through the intestines.

Intestinal irritants. In those cases of spastic constipation it is especially desirable that patients refrain from eating highly seasoned foods. The diet should be free from condiments, such as mustard, pepper, horseradish, etc., as these substances only tend further to aggravate spastic stasis as the result of their irritating effect on the mucous membrane of the bowels.

Sometimes constipation results from taking unsuitable or excessive food—from faulty digestion which is followed by putrefaction—the formation of irritating poisons. This, in turn, is followed by violent peristalsis or diarrhea designed rapidly to eliminate the poisonous matter from the body, and

the final reaction to all this upheaval results in intestinal muscular atony, bowel-fatigue and its associated constipation. We know that many cases of persistent constipation follow preceding, prolonged, or frequent recurring attacks of dysentery or diarrhea.

11. *Reflex causes.* Certain conditions of the body outside of the bowel itself, and remote to it, are sometimes contributory in the causation of constipation.

And so we come to recognize many influences apart from local conditions in the bowel itself, which may directly or indirectly contribute to the production of constipation of varying degrees of severity and chronicity.

When *fissures* or other inflammation of the rectum exist there may be produced a spasm which, through its pain, inhibits defecation.

Any and all *conditions which cause pain* to be associated with defecation, unfailingly predispose to constipation. If the individual suffers with each bowel evacuation, he unconsciously tends to postpone such occasions, and thus such painful rectal disorders always result in bringing on constipation as an additional ailment.

PREVENTION OF CONSTIPATION IN CHILDREN

The usual cause of constipation in children is the fact that they are not awakened sufficiently early in the morning, they are obliged to gulp down breakfast in great haste for fear of being late to school, so that naturally they have little or no time for a quiet response to a call of Nature. Mothers must be taught the great importance of regularity and see to it that at least an hour and a half is available for washing, dressing, breakfast and attention to bowel elimination.

The diet of children should consist chiefly of vegetables, fruit, butter, sugar, eggs, milk and rye bread. Meat and fish must hold a subordinate place in the menu. It is not advisable for children having a tendency to constipation to eat meat every day; a little meat two or three times a week with vegetables and fruit will be sufficient.

An abundance of vegetables and fruit should be found on the table at all times, and these should be varied as much as possible so that the children may not lose their appetite and enjoyment of food by reason of monotony in diet. Sweets, especially cookies, and white bread, chocolate, candy and such

like dainties should be restricted in the case of children who are seriously constipated.

In spite of this over-rich nourishment, many children do not thrive; they tire easily, are backward in school, and have cold hands and feet. Though there may be a progressive increase in weight, the bowel activity leaves much to be desired. Such children are doomed to a life of misery if the parents are foolishly inclined to do the doctoring with regularly repeated doses of laxatives, or if, with the idea that unaided Nature will do all that is necessary, they let things run along. If constipation is neglected in early childhood, it will be doubly difficult to cure later on in life.

In combating constipation in childhood do not overlook the value of orange juice and prune juice—and the whole prunes and oranges in older children. If it is necessary to administer any laxative, first try mineral oil. Of all the medicinal laxatives cascara sagrada is the least objectionable.

TEN GOLDEN RULES OF PREVENTION

1. Make a practice of going to the toilet twice a day—early in the morning and before retiring at night.

2. Do not be in a hurry at stool. It is sometimes ten or fifteen minutes after the first passage, before the main bowel movement comes down in the rectum for evacuation. Be patient and relaxed at stool.

3. Eat your meals at as near the same hour every day as possible, and eat them slowly. If you are irregular in taking your nourishment your bowels are also likely to be irregular.

4. Imitate the countryman in your choice of diet. Avoid large quantities of meat, fine confections and puddings. Let your diet consist chiefly of rye or whole wheat bread, fats, fruit, vegetables and salads.

5. Spend at least a half hour or a whole hour every day in open air exercise. Trunk bending exercises are especially valuable.

6. Do not allow yourself or your children to fall into the laxative habit. The longer the abuse of cathartics has continued, the more difficult will be the cure of your constipation.

7. When you are forced to take a cathartic, select the simplest and the least harmful. Either have a physician prescribe your laxatives or else read up on cathartics and become intelligent respecting their nature and action.

8. Reject all laxatives the composition of which is unknown or which are secret remedies. In doubtful cases make it a practice to consult your physician. Don't take every remedy suggested by interested friends and neighbors.

9. If you take an enema don't distend the rectum with too much fluid. Avoid too cold or too hot injections. Add no irritating substances to the injection fluid. Cool enemas are better than very hot.

10. Follow a good anti-constipation diet conscientiously. Even should it work unsatisfactorily at first do not get discouraged. Do not abandon the diet too abruptly. When the constipation has lasted for years keep the principles of the diet in mind for the rest of your life.

TREATMENT OF CONSTIPATION

When it comes to the general management of constipation—the thing of most importance is regularity. Physical exercise is also a great help, such as deep breathing exercises; in fact, any exercise that calls into play the larger abdominal muscles. Even the correct position at stool—the squatting position—is of considerable assistance.

The use of massage, vibration and electricity may all be of some help in the treatment of constipation, but they are certainly not to be relied upon as the chief curative agents.

Hydrotherapy is of value. Hot and cold applications to the abdomen are helpful, and the moist abdominal girdle worn about the abdomen all night is a great help, especially in certain types of nervous persons who suffer from constipation. Even the mental factor exerts a great influence in these same nervous cases.

The enema is of value in the management of constipation, but it should be only occasionally employed. To use it habitually is only to encourage the enema habit which, in some instances, is almost as unfortunate a bondage as the cathartic habit.

Perhaps the most valuable single remedy that can be employed in constipation is mineral oil. This substance can be used indefinitely without producing any harmful effects in the case of the average patient; and when a suitable diet, including bran, does not relieve, mineral oil should be employed.

Don't make the mistake of trying to cure constipation with laxatives, cathartics, or mineral water. In case it is necessary

to take a laxative, some simple drug should be used like senna or cascara sagrada.

Suppositories are of value as a temporary expedient especially when travelling. The glycerin suppository will afford immediate relief and sometimes does less mischief than the enema.

If constipation is due to kinks and adhesions, only surgery will afford relief.

There are many faddish cures for constipation, such as the grape cure, the buttermilk cure, the yeast cure, and they are all of more or less value, especially when employed in certain appropriate cases.

A simple régimé for handling constipation consists in taking exercise immediately on arising in the morning, such as trunk bending, or any system of setting up exercises, following the drinking of two-thirds of a glass of cold water, and then to eat a breakfast in which one of the following foods is always present: apples, grapefruit, cranberries, figs or bran. See that bulky foods are eaten at each meal during the day, and take a walk in the open air just before retiring; also eat an orange or an apple just before going to bed. This simple régimé with the practice of going to stool both morning and evening, that is, just after breakfast and just before retiring, will serve to bring about the cure of many cases of constipation.

DIETETIC MANAGEMENT OF CONSTIPATION

When we come to diet as a curative practice in constipation, one of the first things we should bear in mind is regularity in eating. This is especially true of the nervous types of persons who suffer from intestinal stasis.

The next important thing in the anti-constipation diet is the bulk or roughage. Foods which are rich in cellulose are valuable, such as asparagus, cauliflower, spinach, green corn, popcorn, graham flour preparations, oatmeal preparations, apples, blackberries, cherries, cranberries, melons, oranges, peaches, raw cabbage, celery, greens, lettuce, onions, parsnips and turnips.

It is also necessary to provide for proper moisture in our efforts to treat constipation. The soups, fruits, vegetables and milk all serve this purpose, and it is along this line that agar works; it is a water carrier—it holds moisture as it passes through the intestinal tract.

Fats and oils are also laxative in their effect. All forms of fat, including butter, olive oil and the foods which are rich in fat, are valuable.

The acids, salts and sugars are also intestinal stimulants, and their value in the treatment of constipation must not be overlooked. In this way lemonade, on the one hand, is slightly laxative, while fruit, jams and honey are also of considerable value.

CHAPTER XXII

TEA AND COFFEE

Tea and coffee are narcotic drugs containing from 3 per cent to 6 per cent of a poisonous principle. About a billion pounds a year of these substances are used in this country, containing 15,000 tons of poisons. A 40 to 60 grain dose of these narcotics might even prove fatal to many individuals. Each year the American people consume 8 billion to 10 billion doses of caffein and thein, or almost enough to cripple or kill the whole world, if given in single dose.

The effect of the continuous use of these drugs is shown on the complexion and also manifests itself as headache, nervousness, sleeplessness and the development of that peculiar experience which accompanies all drugs, but does not attach itself to the use of foods; that is, that the individual using them gets to the place where he just "can't do without it."

Hollingsworth, who published the best study of the effects of caffein which has come to my attention, says that the average cupful of hot tea (five fluid ounces) contains one and five-tenths grain of caffein. An after-dinner cup of black coffee (two fluid ounces) contains one and five-tenths grains of caffein. An average glass of iced tea contains two grains of caffein. An average cup of good coffee and milk (three ounces of coffee and two ounces of milk), contains two and five-tenths grains of caffein.

Some of the peoples use tea instead of coffee. Probably the Chinese and Indians are the most inveterate tea drinkers, but there is no way of knowing the per capita use of the drinks by these peoples. The New Zealanders, Australians and nations composing the United Kingdom are the heaviest users of tea. They consume more than 6.5 pounds per person. The Canadians use 4.3 pounds; Hollanders, 1.45; Russians, .94; Americans, .89; Germans, .11, and French, .06.

Tea contains about twice as much caffein as does coffee. By multiplying the per capita amount of tea by two and adding it

to the pounds of coffee, we get a fair idea of the relative use of caffein-containing beverages by the races for whom we have statistics.

We find that the Hollanders lead with seventeen pounds. They are followed by the Swedes and Norwegians. Next comes a group composed of the people of the United States, the British, including English, Scotch and Irish, and the Australians. Their rate of consumption is around fourteen pounds. The Canadians use nine and six-tenths pounds. The Germans use about seven, and the Russians about four.

Legends tell us that the Chinese used tea 3,000 years before the birth of Christ. Europeans began to use it in the sixteenth century. In the seventeenth century its use in England was fairly well established. By the eighteenth century the English people were using it at one-third the per capita rate now prevailing.

EFFECTS OF CAFFEIN

The following conclusions seem justified by the work of Hollingsworth and that of Rivers:

1. Caffein in small doses (one to four grains) increases the quantity and quality of mental and physical work.

2. Caffein in larger doses (six grains and over) decreases the above capacities as often as it increases them.

3. Caffein increases the capacity for work of a tired brain or tired muscles.

4. Caffein produces a sense of buoyancy and well-being.

5. The stimulating effects of caffein are not followed by the serious depression which follows the use of other drugs.

6. The amount of caffein in one full cup of coffee does not always produce sleeplessness or nervousness. Many took the amount in two cups without discomfort. Many were disturbed by two cups. When the amount taken went beyond the amount of caffein in two full cups the majority were harmed by it.

7. The effects of caffein are less in fat people than in thin ones.

8. The effects are much less when the drug is taken with food.

9. The drug is somewhat slow in exerting its effect. Generally more than an hour was required. Often two or three hours passed before the effect was felt, and some of the effect commonly held over until the next day.

THE COFFEE PROBLEM

Is the use of coffee of service? Yes. When? When one is tired, fatigued, unable to concentrate, and yet must keep going or must keep up for some supreme effort.

Does the daily use of coffee as a beverage, continued for a series of years, do harm? Yes. A horse cannot be whipped daily for years without being harmed. A man cannot be nagged continuously for years without being harmed. The very fact that, when fatigue is slowing muscles and brain cells down, coffee will whip them on; the very fact that under the stimulus of coffee capacity is unduly excited, is proof that harm will come if the process is kept up for a series of years.

Says one authority:

> That no immediate secondary sagging is noted proves nothing. It is the old question of the cost of something for nothing. When, through the influence of coffee, you become able to do and do more than you would otherwise, you must settle some time or other. That is just ordinary sense.

Coffee and nerves. It has been well established that coffee is a good muscle and nerve stimulant: "that it lightens the sensation of fatigue and sustains the strength under prolonged and severe muscular exertion"; "that coffee squads come in first in endurance tests, water squads second, and alcohol squads last"; that coffee produces "a feeling of buoyancy and exhilaration comparable to a certain stage of alcoholic intoxication, but which does not end in depression or collapse." On the mind the first effect is drowsiness, quickly followed by wakefulness.

Coffee and sleep. A great many people are interested in knowing the effect of coffee on sleep. Hollingsworth came to the conclusion that the sleep of the average person was not disturbed by taking one to four grains of caffein (one-half to one and one-half large cups of coffee) a day. Some of the people experimented on slept poorly from even that quantity. When one cup of coffee a day was taken for several days, sleep was disturbed on the second or third day in certain instances, in which there had been no disturbance on the first day.

Most of the people who took six grains a day (a little more than two large cups) slept poorly, in consequence; when the coffee was taken with the food, the harmful effect was much

less than when it was taken alone. Fat people stood coffee better than thin ones. The morning cup of coffee did not disturb sleep so much as coffee taken later in the day.

Coffee and digestion. Coffee taken into the stomach is rather quickly absorbed therefrom. It differs in this particular from tea, since tea is not absorbed until it gets into the small intestines. Therefore, the effects of coffee begin to show themselves after a brief period. The person who has partaken feels the influence within half an hour. Hollingsworth's tests showed effects plain enough to register his subjects in an hour, sometimes less, sometimes more.

In so far as there is any effect on digestion, coffee is of some slight aid. Especially is this true of the after-dinner cup of coffee, taken at the end of a full meal. The stimulating effect of some of the ingredients is somewhat more than an offset to the restraining effect of the tannic acid. The great outstanding effect of a cup of coffee, though, is the stimulation to brain, nerves and muscles—a stimulation without a closely following sagging.

Cocoa cola. We must remember that cocoa cola is simply iced coffee, and like iced tea, the change in temperature does not lessen the caffein content. Such drinks should never be allowed children.

FACTS ABOUT CAFFEIN

There is probably no known narcotic or stimulant which makes such a universal appeal as caffein. Wherever tea, coffee, chocolate, or cocoa are introduced—and they all contain caffein or an analogous substance—human beings acquire an immediate liking for these drinks.

Coffee contains caffein, tea thein, and cocoa theobromin. Caffein is also an active principle of the African kola nut, as well as the South American guarana.

Caffein is a temporary stimulant to the heart and nervous system. An ordinary cup of coffee, depending upon how it is made, contains anywhere from 1½ to 3 grains of caffein. This is approximately the full medicinal dose. Tea also varies on the method of its making, containing from 1 to 2 grains of thein.

Most of the flavor of coffee is due to caffeol, a volatile oil which is developed in the process of roasting.

Both tea and coffee contain tannic acid. Tea much more than coffee.

The longer tea stands the more tannic acid it contains and the more harmful it is to the digestion.

It is a singular fact to record, in the behavior of tea and coffee, that some persons may use these substances for years without noticing harmful effects, and then suddenly a single cup will produce very distressing effects, necessitating immediate discontinuance of the use of these drugs as beverages.

Another interesting observation is that some persons may drink several cups of tea or coffee, go immediately to bed and sleep; while others, a single cup taken in the late afternoon will keep them wide awake most of the night.

Chocolate contains less than 1 per cent of theobromin and caffein, and, of course, for this reason is much less objectionable than either tea or coffee.

Caffein has an effect quite in contrast with that of alcohol in that it sharpens the intellect and increases the acuteness of the senses, stimulates mental activity and seems to promote the association of ideas. It is also different from most drugs that produce these marked effects in that it seems to show little or no immediate after-effect. That is, there is a minimum of reaction following this phenomenon of stimulation.

Like any other drug, if used habitually and in increasing amounts, the good to be derived from a given dose is greatly lessened and it requires, in these cases of habitual use, a maximum of the drug to produce the minimum of effect. Habit tolerance is established in the case of tea and coffee, as in all other drugs, but apparently there is much less of a reaction of this sort. That is, of all known drugs, tea and coffee can be used a longer time, continuing to produce the desired results with less unfavorable reaction.

The bad effects of caffein are seen particularly in hereditarily nervous, anemic and debilitated persons, and when it starts in to produce mischief, there is no end of trouble it can make from tremor, palpitation of the heart, ringing in the ears, stomach trouble, heart-burn, rapid pulse, neuralgia, headache, and in some cases, especially in tea drinkers, chronic constipation.

Tea and coffee cannot be recommended for regular use, but they are valuable when used only occasionally.

COFFEE MAKING

The National Coffee Roasters' Association once appointed a committee on better coffee making. From the report of that committee, the following is taken:

First of all, the ease of extraction of the virtues of the coffee bean is directly proportioned to the fineness of the grinding. The first essential, and the most important, is that the coffee should be finely ground. To grind finely is also economy, as less coffee is needed. Finely ground coffee does not keep its strength. Therefore, grind your own coffee, but in a high grade mill.

Water at 212° F. (boiling) is twice as efficient in extracting color and more than twice as efficient in extracting aroma as water at 150° F. Cold water is very efficient in extracting the caffein and the tannic acid.

The committee tried seven methods of preparing coffee:

1. Coffee placed in cold water, brought to a boil, boiled five minutes, coffee ground medium.
2. Same method, but coffee used was ground fine.
3. Coffee placed in cold water, brought to a boil, taken off the fire and allowed to steep. Medium ground coffee used.
4. Same method, but finely ground coffee used.
5. Percolation three minutes.
6. Percolation five minutes.
7. Filtration; pulverized coffee used.

To get the flavor and only a moderate amount of caffein, use method No. 7. Method No. 6 yields ten times as much tannin as No. 7.

If one wants some flavor, but must avoid the stimulating effects of caffein, method No. 3 is best. It gives less than one-sixth the caffein given by No. 2, and a little more than a fourth as much as method No. 7.

Boiled coffee has the least to commend it. It is high in caffein, tannic acid and bitter matter. Long continued boiling makes the coffee weaker, not stronger. After about five minutes of boiling the aroma is driven off, without extracting from the coffee any desirable matter.

The report says that most of the deleterious effects of coffee are due to excessive boiling, or to the use of grounds a second time mixed with some fresh coffee.

In the steeping method the extraction comes mainly just as

the water boils. In using a percolator the water does not heat above 150° F. The apparent boiling is not really boiling. The condensed vapors percolating through the coffee are not hot enough to extract the best of the flavor of the coffee. It does extract the tannin. Percolated coffee is about 25 per cent higher in caffein than filtration coffee. It requires more coffee than does the filtration method.

In the filtration method the finely pulverized coffee is placed in a close mesh muslin bag. Boiling water is poured through it slowly. Nothing is gained and something is lost by pouring the water a second time. This method uses least coffee.

In the comparative tests the experimenters used 1,200 grains of coffee in a pint and a half of water.

CHAPTER XXIII

THE TOBACCO HABIT

The regular use of tobacco is nothing more or less than a drug habit. The fact that the use of this drug is greatly on the increase makes it important to study its effects.

Aside from *nicotin* tobacco also contains small quantities of related substances—nicotellin, a camphoraceous substance termed nicotianin, said to give tobacco its characteristic flavor, and likewise a volatile oil developed during the process of preparation. On heating, pyridin (a substance often used to denature alcohol), and other bases are formed, as well as carbolic acid, ammonia, marsh gas, cyanogen and hydrocyanic acid, carbon monoxid (coal gas) and furfural.

NICOTIN

It has been maintained by some that nicotin is practically destroyed in the process of smoking, and that the effects of tobacco are limited to the decomposition products resulting from the burning tobacco, especially pyridin. But pyridin is also formed in the burning of cabbage leaves, and cabbage leaves do not possess any attractions for smokers, neither do they produce the well-known effects that smoking and chewing tobacco produce.

No doubt pyridin and furfural are factors in the drug effects of tobacco, but recent painstaking experiments by high authorities have shown the presence of nicotin in tobacco smoke, and when we reflect that there is sometimes sufficient nicotin in an ordinary cigar to kill two men it is not strange that enough of it may be absorbed from the smoke passing over the mucous membranes of the nose, throat and lungs to produce a distinct physiological effect.

Investigators who claim to show by experiments the absence of nicotin from tobacco smoke must explain why the palpable effects of smoking, in those who have not established "tolerance," are those of nicotin poisoning, and why the symptoms

produced by chewing tobacco are identical with those following the smoking of tobacco, which are: mild collapse, pallor of the skin, nausea, sweating, and perhaps vomiting, diarrhea, muscular weakness, faintness, dizziness and rise in blood pressure.

Nicotin is undoubtedly decomposed by burning, but it may become volatilized by heat and a certain amount absorbed before decomposition takes place.

EFFECTS OF TOBACCO

Tobacco raises the blood pressure in the average individual and seems to have a quieting, sort of narcotic effect, on the nerves. In some cases the brain seems to be mildly stimulated. Individuals vary greatly in their reaction to nicotin. Among the effects of over-use of the drug are inflammation of the throat; congestion of the tonsils; dry, tickling cough; increased acidity of the stomach, and indigestion; increased heart action, or even palpitation; sharp pains in the region of the heart; increased perspiration, especially in the hands; cold hands and feet; muscle and joint pains, with headache; contraction of the pupils and dimness of vision; increased irritability of temper and sleeplessness. There is sometimes a tendency to diarrhea.

Smokers' sore throat. The redness and dryness of the mucous lining of the mouth and throat so common with smokers, is the result of the direct irritation of the hot fumes of the poisonous weed which are drawn in through the pipe or cigar. This cause of chronic disease of the throat is so very common that "smokers' sore throat" has come to be recognized as a distinct malady. Some smokers pretend to smoke for the cure of throat difficulties; but the excuse is a mere pretense in most cases. Tobacco never cures sore throat. It may temporarily relieve local irritation, but can do no more, and always increases the disease.

Tobacco and indigestion. Notwithstanding the fact that tobacco is very frequently recommended as a sovereign remedy for dyspepsia, we have become convinced that it is seldom or never a cure, and is in hundreds of instances a cause of indigestion. Tobacco is a narcotic. A man who is hungry may appease his desire for food by using tobacco if he is accustomed to it, or by the employment of some other narcotic. The desire is appeased, although the want still exists. It is through this same paralyzing influence that tobacco impairs digestion,

Cancer. Unquestionably the use of tobacco favors the appearance of cancer of the lip in certain predisposed individuals, those who belong to cancer families, and it is thought that those who use a pipe in which the stem is likely to become more or less heated are more likely to contract this form of cancer.

TOBACCO TENDENCIES

The effects of tobacco may be summarized as follows:

1. Circulatory disturbances, consisting of pain in the region of the heart, palpitation of the heart, shortness of breath, and irregular pulse. Blood pressure as a rule is increased, but in certain cases where the drug is used exclusively, the blood pressure is unusually low.

2. Nervous disturbances, consisting of headache, dizziness, tremor, depression, and increased nervous irritability.

3. Digestive disorders, consisting of increased acidity of the stomach, heart-burn, and bilious attacks.

4. The special senses are affected so markedly in some cases as to produce partial blindness or deafness, and other disturbances of the hearing or vision.

5. The local action of nicotin is such that it irritates the throat and predisposes to cancer of the lip.

6. Cigarette smokers frequently have a barking cough. They suffer from chronic hoarseness and sometimes acquire a smokers' tongue (leukoplakia), which is anything but an innocent disorder of the tongue. Sometimes these whitish patches tend to become cancerous, although it is only fair to say that other causes beside excessive use of tobacco may be responsible for this latter condition.

7. Charles B. Towns, who has had a very large experience with drug habits of various sorts, contends that tobacco does more harm than alcohol, cocain, and opium, and that "nothing else at the present time is contributing so surely to the degeneration of mankind as tobacco." This same authority has also observed that it is very difficult to cure an alcoholic unless he gives up the use of tobacco.

8. Says Osborne:

> The loss of efficiency in mental and manual work is very great in those who over-smoke, and the loss of mental efficiency by young growing boys who smoke cigarettes has long been demonstrated, and is a positive fact. It has also been demonstrated that a large number of delinquent boys and boys who reach the courts through mis-

behavior are largely cigarette smokers. Also many cigarette fiends become later "dope" fiends, and young men who were wont to take too much alcohol were also frequently very hard smokers, mostly of cigarettes. In other words, the use of tobacco in young boys and the over-use in young men is conducive to bad morals in all lines, and the greatest disturbance to mental efficiency seems to occur in those who use cigarettes.

THE SMOKING PROBLEM

The use of tobacco does no good. Therefore, there is no reason why any person should plan to use it. Used in small amounts by grown persons it may do little harm. It is just as useless and just as harmless to women as to men, and therefore there is no physical reason why women should or should not use it. There is no more logic in different tobacco standards for the sexes than there is in different morality standards, except in case of pregnancy, where its use might injure the unborn child.

Heavy users of tobacco excrete it from all parts of their bodies. This means that every cell in their bodies is bathed in the products of tobacco. The cells of matured tissues will stand a great deal of this, and for a long time, before they show evidence of disease.

Tobacco blindness is due to degeneration and final destruction of the optic nerve. Tobacco heart is a term applied to a heart which is irritable. It is the result of irritation of the heart nerves and degeneration of the heart muscle.

Tobacco juice in the mouth is not an antiseptic. It does not kill germs nor keep the tonsils or teeth clean. The same is true of tobacco smoke.

Tobacco users are usually spitters, and thus, indirectly, harm is done.

There are those who believe that they can sit down and think more deliberately and with better judgment when smoking than when they are not. There is nothing in the effect of tobacco which is responsible for this difference. It is suggestion, a psychological phenomenon. Nevertheless, to them it is a fact which cannot be questioned.

There is no more harm in cigarettes than cigars or pipe tobacco. In the main, the tobacco in cigarettes is not of a high grade. No chemicals are mixed with it except a small percentage of glycerin. As it is a light smoke, there is a greater disposition to inhale than when cigar or pipe smoking is indulged in.

Says Dr. Evans:

> The main objection to cigarettes is that they especially appeal to boys with immature, impressionable tissues and with habits in the forming. There are very grave objections to the use of tobacco by children and youths. This forms the strongest arguments against cigarettes.

TOBACCO POISONING

The poison contained in a single pound of tobacco is sufficient to kill three hundred men if taken in such a way as to secure its full effect. A single cigar contains poison enough to extinguish two human lives if taken at once.

The essential oil has been used for homicidal purposes. Nearly fifty years ago it was employed by the Count Bocarme to murder his brother-in-law for the purpose of securing his property.

The Hottentots use the oil of tobacco to kill snakes, a single drop causing death as quickly as a lightning stroke. It is much used by gardners and keepers of greenhouses to destroy grubs and noxious insects.

A number of instances are recorded in which instant death has been produced by applying a little of the oil from the stem or bowl of an old pipe to a sore upon the head or face of a small child.

The poison of tobacco is so potent and violent in its action that even the external application of the moist leaves to the skin is sufficient to produce most serious symptoms. If a cigar be unrolled and the leaves composing it be applied over the stomach, great nausea will be produced in a very short time. This method has been used to induce vomiting. Cowardly soldiers have been known to place tobacco leaves under their arms just before a battle, for the purpose of producing sickness.

Some years ago a man was detected in attempting to smuggle a quantity of tobacco by placing the leaves next to his skin. The nearly fatal symptoms led to the discovery of the smuggling.

BREAKING OFF THE HABIT

Some patients are able to give up their tobacco without a struggle, even when the habit is of years' standing, while others succeed only after a severe fight or after repeated attempts. We are never able to estimate the hold which tobacco has upon a given patient, and we are not, therefore, in position to esti-

mate the effort which will be required to gain one's freedom from this drug habit. I have found the so-called silver nitrate treatment of the cigarette habit valuable—it at least possesses a psychological value—in that it represents something definite being done for the "cure" of the patient. Other aids in breaking up the nicotin habit are the use of Turkish or Russian baths, the wet sheet pack, and the electric light bath. Electricity, preferably in the form of galvanism to the spine, fomentations to the spine, leg baths with cold applications to the head, fomentations or arc light over the stomach and liver, warm baths and cold salt rubs, are all effective measures in relieving the nervousness from which so many patients suffer immediately after giving up tobacco. Graduated cold baths may also be given daily in connection with these eliminative procedures.

The sweating pack is also valuable and consists of a three or four minute bath at a temperature of 105° to 110° F., followed by wrapping in a linen sheet wrung out of cold water, while the patient is further protected by being wrapped in a double blanket so as to induce immediate and profuse sweating. At the end of the pack, the patient should be given a cold sponge or cold mitten friction in order to prevent subsequent chilling of the body and catching cold.

The cigarette cure. Reduce the use of the drug down to a minimum, then break off. If the patient is restless, he may chew gum. An excellent plan is to dissolve 1/50 grain quinin tablet in the mouth as often as they feel the desire to smoke. These patients are helped by sweating freely once or twice a day. Keep the bowels moving freely, drink an abundance of liquids and fruit juices, subsisting on a diet of little or no meat, with plenty of fresh fruits and vegetables.

1. *Mouth-wash.* Six ounces silver nitrate solution, one-eighth to one-fourth of 1 per cent (cost does not exceed 25 cents)—use as a mouth-wash after each meal, not to exceed three days; then after breakfast only for not more than four days. Do not swallow any of the solution.

2. *Gentian root.* Five cents' worth (not the powder). Chew a little whenever the desire for smoking appears. Gentian root is slightly tonic and an aid to digestion. It may be used for several weeks without injury.

3. *Diet.* The diet for the first two weeks consists exclusively of fruits, well baked cereal foods, and milk. Whole

wheat or rye bread, etc., may also be used. The moderate use of nuts, well masticated, is of value. At the close of each meal use fresh subacid fruits, such as peaches, pears, apples, pineapples, etc. Sweet milk, buttermilk, or malted milk may be used in place of coffee, tea, or cocoa.

4. *Determination.* Determination—will power—is the important item in the cure of any drug habit. You can always do the thing if you have thoroughly made up your mind to do it.

CHAPTER XXIV

ALCOHOL AND OTHER DRUG HABITS

This chapter will be devoted to a consideration of the prevention of the various drug habits. An enormous increase in the use of drugs in this country is indicated by recent Government reports which show that the American people are consuming the following drugs per capita each day: Alcohol, 356 grains; nicotin, 6 grains; caffein, 6 grains; opium, 1.5 grains—a grand total of about 370 grains of narcotics a day for each man, woman, and child.

DANGERS OF SELF-DRUGGING

We cannot too strongly condemn the practice of self drugging, which so many carry on, especially the taking of coal tar products for headaches and sleeplessness. I refer to such common remedies as the bromides, acetanilid, antipyrin, phenacetin, sulphonal, and trional, as well as the more serious habit-forming drugs. These remedies can never remove the cause of trouble, and they are highly injurious in that they weaken the heart action and introduce into the system drug poisons which irritate the nerves. It is needless to caution the reader against the use of any sort of "dope" which may contain cocain, morphin, or heroin. The nervous sufferer who seeks the bliss of Nirvana by the use of these deadly drugs is doomed to certain disappointment in that they will ultimately wake up and find themselves suffering the tortures and torments of a literal hell, mentally, morally, and physically. It must be remembered that when worry is cast out by drugs, like the demon of old it is sure to return ere long, with seven devils more wicked than itself.

Whatever may be our views as to the wholesomeness of the habitual or moderate use of stimulants and narcotics on the part of the people at large, there can be little or no debate attending the proposition that all persons of nervous tendency or neurotic taint should religiously abstain from the use of

alcohol in all its forms as well as to eschew all other stimulating or narcotizing drugs.

DRUG HABITS

Habits are acquired for quinin, aspirin, and coal-tar products, as well as morphin and cocain.

In former times, before the Harrison law, about 50 per cent of morphin addicts were believed to come from repeating physicians' prescriptions which contained this substance.

Of little more than 3,000,000 men examined by the Draft Board, 2,000 were rejected because of chronic alcoholism or other drug habits.

Mothers often give their babies soothing syrups containing opium, to quiet them and to keep them from crying. Nothing is more harmful, even dangerous, to the tender body of a child. This is a practice that has caused the death of thousands of babies and injured hundreds of thousands more. A baby has been known to be killed by one drop of laudanum, a fluid preparation of opium. Paregoric is a dangerous drug to give without a physician's supervision.

Acetanilid. This is a highly dangerous drug, the effect of which upon the heart is often depressing to a fatal extent. Many cases of death from acetanilid and other nostrums containing this cheap but dangerous poison are being constantly reported. The following well known proprietary remedies depend chiefly upon acetanilid for their effects, and hence are all capable of producing fatal results:

Orangeine	Megrimine
Ammonol	Bromo Seltzer
Anti-Headache	Salacetin
Royal Pain Powders	Dr. David's Headache Powders
Phenalgin	Miniature Headache Powders
Cephalgin	Antikamnia

ALCOHOL

Alcohol is the secretion of the yeast plant and various alcoholic beverages contain anywhere from two to three per cent, as in beer, up to forty or more per cent of alcohol, as found in brandy and whisky. Champagne contains about ten per cent of alcohol, as do many other wines.

Alcohol concerns us in this book because it is the cause of numerous diseases, and abstinence from its habitual use is one of the ways in which the present generation can prevent

many diseases, such as hardening of the arteries, Bright's disease, cirrhosis of the liver, heart failure, apoplexy, paralysis, etc.

While alcohol lowers the blood pressure immediately after it has been taken, in the end—through its effect on the arteries and kidneys—it tends to raise the blood pressure.

Alcohol is not a stimulant. It is a narcotic. If taken in sufficient amounts it produces complete paralysis of the nervous system. Its deceptive feeling of stimulation comes from its early effects upon the stomach and in its loosening of the guiding strings of control and discretion in the mind. It paralyzes the higher centers of the mind and arouses the lower animal propensities.

Alcohol is a great deceiver in that it makes one feel warm when they are cold, strong when they are weak, and rich when they are poor.

Physicians do not make use of alcohol nowadays in the treatment of typhoid fever and pneumonia as they did in former years, and neither is it used as a cure for snake bites at the present time.

While alcohol may have some fuel value, it is not a real food. It is a drug—more truly a poison.

Like all other drugs, human beings behave differently to alcohol. Some individuals can consume a great deal more than others without experiencing immediate injury.

Alcohol not only leads to physical degeneration and mental demoralization, but it often ends in that terrible disease, delirium tremens, which is often fatal.

There is little that alcohol can do as a medicine but what some other drug can do equally well or better, and in view of its ravages, especially in the case of certain predisposed and nervously weak individuals, it can hardly be looked upon as a desirable beverage in health or a useful medicine in disease.

The life insurance companies tell us total abstainers have a much lower mortality as compared with those who use alcohol regularly.

THE RÔLE OF ALCOHOL

Alcohol temporarily lowers the blood pressure. Just as tobacco produces a pale skin and drives the blood inside, thus raising the pressure, alcohol produces a red flush of the skin, showing that the blood is being drawn to the surface and the

blood pressure is lowered. That is why one feels warm under the influence of alcohol, even when he is colder, or even freezing.

Now we begin to understand the vicious circle of multiple drug addictions. A large part of the people use tobacco. They are all living the strenuous life. Their dietetic and general living habits are those belonging to the strenuous order. They use large quantities of condiments, tea, and coffee. But this cannot be kept up indefinitely without producing results. Several times a day, a week, or a month, the neurotic individual reaches the "bursting stage." He feels wrought up to the highest pitch; keyed up to the last notch. He is intensified to the highest degree. He must in some way find a safety valve.

There must be some way to relieve this constantly increasing tension, and the patient finds temporary relief by taking alcohol, which not only dilates the blood vessels of the skin, thus relieving the blood pressure, but also benumbs the higher sensibilities so that they are not susceptible to the fears, worries, anxieties, griefs, and disappointments that were previously harassing the mind. In this way, alcohol affords a welcome temporary relief to the distracted nerves of the restless and neurotic victims of the high pressure life.

No doubt many persons inherit a craving for stimulation—not necessarily a specific taste for alcohol, but a nervous instability which leads them to become peculiarly susceptible to temptation. Many authorities believe that the excessive use of tobacco leads to alcoholism. The advantage of prohibition—if it works—will probably be in preventing young persons acquiring a taste for alcohol.

Dr. Stockard, in his experiments on guinea pigs, has shown that even the inhalation of alcoholic fumes not only harms the individual animal, but that the effects of this alcoholization may be observed for several generations, suggesting that alcohol may even have some influence on the germ plasm.

Alcohol tends to paralyze and pervert the white blood cells—those little living creatures which inhabit the blood and whose duty it is to defend us against the microbes of infection. In this way, alcohol predisposes its users to fall victim to all contagious diseases, colds, pneumonia, consumption, blood poisoning, etc.

In these days of moonshine and adulterated alcohol, syn-

thetic gin, etc., it is well to remember that much of the intoxicating liquor consumed, except on a physician's prescription, must be more or less adulterated; whereas, the output of the illicit still in the hands of amateur brewers may sometimes contain numerous deleterious substances in addition to the alcohol content of these moonshine beverages.

RESULTS OF ALCOHOL

Many diseases are either caused by alcohol or contributed to by its use. One authority names the following: Gout; heart disease; digestive disorders; kidney trouble; obesity; hardening of the liver; apoplexy; tremors; ulcers; insanity; epilepsy; tuberculosis; eye troubles; infections; diabetes; impotency; hardening of the arteries; and delirium tremens.

There is no question but that alcohol contributes enormously to premature hardening of the arteries and to hobnail liver, though other forms of chronic intoxication may also contribute to these disorders. Alcohol is not the only cause of heart disease, but it undoubtedly contributes enormously to the heart disease mortality, as we know it to-day.

Atwater and others have made experiments which have tended to show that alcohol possesses some little food value, but this is hardly true when the matter is given practical consideration. The facts are that while alcohol is a fuel it is not a real food, and even then its poisonous qualities far overshadow its trifling fuel value.

Not only is it misleading to represent that alcohol is food, but also that it is a stimulant. It is more truly a narcotic. Aromatic spirits of ammonia is a better stimulant than alcohol. It may be serviceable in keeping people alive for a few hours sometimes in a crisis, but it is of little or no value if its use is continued over a few hours.

People well understand now that alcohol does not neutralize toxins. It is no longer used as a cure for snake bites, or in blood poisoning. In fact, there has come to be very little if any place for alcohol as a medicine.

DRUG FIENDS

The morphin habit is usually acquired in an effort to relieve pain. Most of its victims fall into the trap unintentionally.

On the other hand, there is no excuse for the cocain habit. It is acquired by people who merely want to stop thinking

now and then. Cocain is only used to remove cinders from the eye, or in the case of some trifling surgical operation now and then. It is not used to relieve pain repeatedly, as in the case of morphin. Certainly only highly unstable and neurotic individuals ever become cocain fiends and they represent on the whole a much lower class of individuals as compared to those who fall victim to alcohol, morphin, or opium.

Can these people be cured? Yes, in the majority of cases. The alcohol cure is fairly successful with the patient's co-operation; morphin and opium cure, more successful; and the cocain cure the least successful of all.

The cocain fiend is the craziest of all of them when his drug is first withdrawn, but he loses the craving more quickly than in the case of other drugs. Also he is more quick to go back to his habit, even when he is once cured, because in the majority of cases he was a neurotic, wabbly individual before he contracted the cocain habit, and, of course, being a victim of that drug for a while has hindered rather than helped his inherent nervous condition.

There is only one thing to do for the drug fiend, and that is to go to an institution or to place himself in the hands of a physician who will take him to the proper hospital where he can be taken charge of and where everything that concerns him is carried out in accordance with the doctor's orders until he is discharged as cured. In the past the cures of the drug fiends have been fairly successful, and if we can continue to make it more difficult for them to relapse—to get the drug after they are cured—in the future, these drug cures will turn out to be more and more successful.

The prevention of the morphin habit lies largely in the hands of the medical profession, as the majority of the habitués are started down this pernicious pathway by having the drug prescribed for them by some physician for the relief of pain. On the other hand, in the case of cocain the drug is not used so much for the relief of pain as it is just to help the individual to get away from their wabbly and shattered nerves.

Perhaps it would be a good thing for every city and state to follow New York City and enact a law making it illegal to sell hypodermic syringes. Reliable authorities estimate that we have considerably over 100,000 opium addicts in the United States.

MORPHIN

Morphin lowers the blood pressure; so, when the individual has used tobacco or cocain, which result in unduly raising the pressure, it is only natural that he should seek relief from this tension by the use of either alcohol or morphin. This is why alcohol and tobacco go hand in hand; tobacco producing high pressure and alcohol low pressure, but a low pressure cannot long be tolerated—the individual must have something to tone him up, to restore the pressure, and this is secured by more tobacco. Likewise, morphin and cocain play into each other's hands—the one temporarily counteracting the effects of the other, until the unfortunate victim is a user of both. All methods of relieving high tension or overcoming insomnia by drugs are snares and delusions.

Dr. S. Dana Hubbard shows the magnitude of the traffic in narcotic drugs by quoting the following figures:

> The average yearly consumption of opium for a period of five years was 491,043 pounds, which at the price of $40 a pound would make a total value of $18,841,720. The average consumption of coca leaves for the same period was 1,048,250 pounds. At the present price of $1 a pound this would represent approximately $20,000,000.

He says that it has been estimated that "about 90 per cent of the opium and cocain imported is used for other than medicinal purposes; and 80 per cent of the addicts visiting the New York Department of Health Clinic are young men and women just out of their teens."

Hubbard thinks that no less than half of the addicts can be brought back to useful lives, and he states that "bad associates and evil environments are the chief cause in producing addiction among youthful habitués in New York."

CHAPTER XXV

OLD AGE DISEASES

The fact that in the United States the general death rate has steadily fallen for the past several decades, a phenomenon common to all civilized countries, is accepted by many as evidence of a steady gain in national vitality. That there has been a gain in vitality in the younger age groups is unquestionably true, but this gain has served to mask a loss in vitality at the older age periods. This latter phenomenon, a rising mortality in elderly life, is something almost peculiar to the United States. It is not exhibited in the mortality statistics of the leading European countries.

Mr. Rittenhouse of the Equitable Life Insurance Company published an interesting statistical study showing the growing importance of gout, Bright's disease, and heart disease from the life insurance standpoint. He says:

> It seems to me that the life threatened by apoplexy is just as much worth saving as the life threatened by tuberculosis. The loss of adult American life through the more important non-communicable diseases has increased with extraordinary rapidity. Allowing for the increase in population, about two persons die now where one died thirty years ago from preventable or postponable diseases of the heart, arteries, kidneys, and brain, which usually affect a person in the most valuable and effective years in life.

The principal reason for this increase is that so many of the population who formerly died in infancy, youth, and early maturity are now living to the age of risk from heart and kidney diseases.

During the past thirty years the mortality from these degenerative diseases has nearly doubled. Of the hundreds of thousands of American lives that are annually snuffed out by these "old age" disorders, nearly half die before their time. While men above sixty might be said to succumb to them normally, almost 50 per cent of the fatalities recorded are of men under sixty, and many thousands of them die under forty —and these are diseases that, whether in old or young, can

be prevented, or at least postponed, for longer or shorter periods. It would seem to appear that old age is more or less the result of chronic poisoning of the cells of the body, more particularly affecting the cells of the blood vessels, kidneys, heart, etc., and this is just why the so-called "old age" diseases, which are discussed in this chapter, are greatly on the increase at the present time, instead of being on the decrease as is the case with most other disorders causing death. Our much boasted advancement in sanitation and public health has had so little to do with improving personal hygienic practices of the people—in fact these practices have become, it would seem, gradually more and more pernicious, so that the death rate, instead of being improved, has been alarmingly increased.

THE CAUSES OF OLD AGE DISORDERS

It is altogether fitting at this juncture to summarize the causes of the various old age disorders. These causes may be classified under the following heads:

1. *The habitual use of drugs*—alcohol, tobacco, patent medicines, headache powders, together with the excessive use of tea and coffee.

It must be borne in mind that one ordinarily feels languid, depressed, and good for nothing when the blood pressure is too low; whereas one usually feels exhilarated and tiptop when the blood pressure is high; therefore, there is a constant tendency to make use of those things which increase the blood pressure, or in cases of suffering from low pressure, to resort to the use of high pressure producers to counteract the unpleasant low pressure effect.

The American people spend more money every year for tobacco than for bread. This will give some idea of the enormous consumption of this poisonous weed, and throws much light on one of the causes of this increase, in recent years, of old age disorders.

There is a single tobacco company that has a capacity for making over ten million cigarettes a day.

Last year the American people smoked 46,680,317,081 cigarettes—ready made—to say nothing of how many were made by the smoker himself from paper and tobacco. Ten years before only 6,836,652,435 cigarettes were used, showing an annual increase of almost forty billion cigarettes in less than ten years. Laid end to end, the cigarettes used last year would

reach around the world thirty times. In addition to all this we consume almost eight billion cigars every year. This does not take into account the chewing tobacco consumed nor the millions of pounds of snuff which is used each year.

2. *Venereal diseases*—syphilis, as in the case of chronic lead poisoning, is one of the great causes of early arterial degeneration.

3. *Dietetic errors*—habitual overeating (three square meals a day), over-flavoring of food, too highly seasoned food—foods that are hot when they are cold. Overeating is especially contributary to these degenerative disorders when it consists in taking too much of the protein foods—lean meats, eggs, cheese, legumes, etc.

It has been shown that the free use of all the condiments which are commonly used by Americans, with the exception of small amounts of common table salt, nutmeg, and cinnamon, tend to have a harmful effect on the liver, blood vessels, and kidneys, to say nothing of their deleterious effects upon the digestive system. Those condiments which may in this indirect way contribute to increasing old age disorders are mustard, pepper, vinegar, cayenne, horseradish, and the other pungent seasoning substances.

Common table salt (sodium chlorid) is not, by any means, an innocent substance when used excessively. Many authorities hold the opinion that the modern "salt habit"—the tendency of so many persons to consume more and more salt on their food as the years go by—has considerable to do with the increase in kidney, heart, and liver disorders.

The American people, in common with their English cousins, consume enormous quantities of the flesh of animals for food. We eat too much meat in this country. All forms of flesh food contain certain irritating substances, such as uric acid and its numerous chemical cousins, which were circulating through the flesh of the animal at the instant of death, and which is swallowed along with the meat, and has power to raise the blood pressure considerably, by its irritating effect upon the tender linings of the blood vessels and its further probable influence upon the nervous system.

4. *Autointoxication* means self-poisoning, and refers to special poisons which may be produced in the body due to derangement of digestion and metabolism, as in the case of intestinal putrefaction. The colon of man is inhabited by untold bil-

lions of germs (colon bacilli) and these secrete a toxin or poison which has a tendency to harden the arteries. The same is true of the toxins of many disease germs.

5. *Deficient elimination*—too little physical exercise, failure to get eight glasses of liquid into the system every twenty-four hours. Too little sweating—too much of a sedentary life—accompanied by chronic constipation and its resultant auto-intoxication.

On the other hand, exposure and long continued overwork may contribute to arterial degeneration. By long continued exposure of the skin to cold and chilling, the blood is driven from the cutaneous vessels (as evidenced by the pallor and goose-flesh appearance). This forcing of the blood upon the internal organs greatly raises the blood pressure and produces injurious congestion of these involved structures and organs.

Moderate, daily, and well-balanced exercise in the open air is invaluable in the prevention and treatment of this whole group of disorders.

6. *Chronic infections*—frequent colds, chronic colds in the head (sinus infection), pyorrhea, ulcerated teeth (almost one-half of old crowns and bridges are found infected on X-ray examination), bad tonsils, adenoids, chronic appendicitis, inflammation of the gall bladder and gall-stones, ulcers of the stomach and duodenum; and in the case of women, chronic infection in some of the pelvic organs—in fact any place in the human body where microbes are able to maintain a latent existence and send forth their toxins to produce, first, rheumatism, neuralgia, neuritis, sciatica, valvular heart disease and then subsequently, arteriosclerosis and Bright's disease. These pus reservoirs have lately come to be known by the name of "focal infections." Many cases of hardened arteries are the result of the toxins of influenza, scarlet fever, and other similar infectious diseases.

You cannot harbor pus in any part of the body over a long period of years without suffering more or less serious consequences. The toxins of these pus microbes are—many of them at least—highly irritating to the delicate membranes which line the heart, liver, kidneys, and blood vessels and the result of their long continued action is to set up a degenerative reaction which in and of itself constitutes this group of "old age" disorders.

7. *The mental attitude*—a mental state of chronic fear, worry, and definite dread, together with mental unrest, anxiety, fits of bad temper, etc.—all contribute to a temporary or more or less permanent rise in blood pressure, and medical authorities are now inclined to think that not only does hardening of the arteries raise the blood pressure, but that the raising of the blood pressure by mental or emotional means, in time, may contribute something to the hardening of the arteries. In many cases, a fairly high blood pressure is found to be almost entirely due to a nervous or emotional state.

8. *The strenuous life* is that combination of modern methods of living which is the typical régimé of modern money-makers, and the strenuous life usually raises the blood pressure. This, then, is the story of the chief causes of the degenerative diseases and constitutes the explanation of their great increase in modern times.

A FRIGHTFUL DEATH TOLL

Over 400,000 persons die each year in this country from these so-called "old age" diseases—heart disorders, arterial degeneration, and kidney diseases. The actual number of deaths from these combined diseases and their indirect consequences cannot be far from half a million each year when we consider that for every 100,000 of population, heart disorders claim 198.4; Bright's disease and kidney disorders, 118.5; cerebral hemorrhage (apoplexy), 99.8; and cirrhosis of the liver, 11.4; making a grand total of 428.1 annual deaths per 100,000.

The only group of diseases which can compare with this frightful loss is the respiratory group—tuberculosis, pneumonia, influenza, bronchitis, etc. Per 100,000 of population this group has a death rate as follows: Pulmonary tuberculosis, 128.7; pneumonia, 164.8; influenza, 17.2; bronchitis, 16.3; yielding a grand total for this group of lung disorders of 327 per 100,000.

If we count the liver disorders and numerous other causes of death indirectly related to these degenerative disorders, it is highly probable that the annual death rate is very close to 500,000 for the entire group of degenerative diseases. About 65,000 citizens die of these old age disorders before they are 50 years of age; and almost 30,000 before they are 40 years old.

And these disorders are not like cancer—we know the causes to a great extent and know what to do in most every case to prolong life. Has not the time about arrived to make a concerted attack on this particular group of our disease enemies?

THE SICKNESS PROBLEM

Is there a real sickness problem in this country to-day which requires a solution and which, if it remains unsolved, is and will be of serious detriment to the health of the nation?

There have been a number of sickness surveys made by the Metropolitan Life Insurance Company in various states of the Union, covering a total of 637,000 persons. These surveys cover 13,321 cases of illness. Of these, 12,114 persons were so disabled as to prevent them from following their occupations. Among the women of all ages, 2.13 per cent were sick and 1.93 per cent disabled. Of the men, 2.05 per cent were sick and 1.87 per cent disabled.

Of the 376,573 people over 15 years of age, 8,636 were disabled; that is, 2.3 per cent. The average loss of time through sickness for each person of working age was therefore 8.4 days, or 6.9 working days per year.

Separating these data from men and women over 15, we see that men have a morbidity rate of 2.28 per cent and women of 2.3 per cent; an average total loss by days of 8.3 for men and 8.4 for women. These are for the white race.

The California commission found that the working days lost each year for wage earners were six per worker in that state. In Pennsylvania the Pennsylvania Health Insurance Commission has found that in their surveys 4.28 per cent of the population are seriously sick at all times, and that 1.5 per cent of the population are disabled from this sickness at all times. The average days of disability per year for all persons is 5.7, and for men during the working days of life at 15 years and over is 8; for women 15 years and over it is 6.3, making the average working days lost per year 6.6 for men and 6.2 for women.

In Ohio the Health and Old Age Insurance Commission estimates that nearly 3 per cent of the people are sick at all times, and that 20 per cent of the workers have a disabling sickness lasting over seven days each year. Each worker loses on the average nine days per year because of sickness.

Cancer, a baffling disease of the degenerative class, to which our people in their present physical condition are highly susceptible, claims over 75,000 lives annually and is increasing very fast. Reported deaths from external cancer alone have increased 52 per cent in ten years.

Over 25,000 Americans are still sacrificed annually to the preventable filth disease—typhoid fever. About 300,000 annually suffer from it and are more or less impaired by some of its after-effects.

About 100,000 Americans are killed annually by accidents and various forms of violence. Our efforts to prevent the steady increase of this waste have not been wholly successful. Deaths from automobile accidents continue to increase.

It is startling to be told that there are more inmates in the insane institutions of the nation than there are students in all the colleges and universities.

THE NEED OF A HEALTH REVIVAL

Health is our greatest national resource. It is the basis, not only of all efficiency, but also of human happiness.

The American people are only half-hearted in their health wooing. They do not enter into the conservation of health and prevention of disease with the same enthusiasm and wholeheartedness that characterizes our individual and commercial life.

We are engaged largely in treating symptoms rather than fighting disease—in dealing with the results of ill health—rather than the prevention of physical disorders. We are undertaking to dam the stream at the mouth rather than to control the flow of disease at its source.

Health is worth the cultivation from the standpoint of efficiency alone, but it also constitutes the foundation of intellectual advancement, while it is also the veritable background for artistic attainment and spiritual enjoyment.

Ill health with its resultant incapacity and maladjustment of home life, in our opinion, is just about equal to all other causes of domestic unhappiness and subsequent divorces.

Sometimes the home is destroyed by that type of ill health which manifests itself as nervous nagging, carping criticism, habitual haranguing and constant complaining.

Many a home that has proved invulnerable to drink has been wiped out by drudgery—that slavery which is half pov-

erty and half disease, and which never fails effectually to destroy human happiness and the joy of living.

Heredity is to blame for a lot of inefficiency, nervous wrecks and failures, just as much as it is for insanity, epilepsy, and feeblemindedness; but lack of training and discipline in the nursery, together with subsequent loss of health, are also to blame for many criminals, hysterics and other erratic and unsocial human beings.

Think of the inefficiency of a modern government when the American people lose almost a million citizens each year from premature deaths and preventable diseases.

In trying to bring about a hygienic revival let us beware of "health fads." Do not make a religion out of hygiene. Avoid both fanatical extremes in health teaching. Look out for both health puritans and hygienic nihilists.

CHAPTER XXVI

THE PREVENTION OF KIDNEY DISORDERS

There are many forms of acute inflammation of the kidneys, as well as numerous chronic degenerative conditions, due mainly to hardening of the arteries. These kidney disorders are commonly known as Bright's disease, and while it may be a local disease in some instances, it usually is associated with degeneration or hardening of the blood vessels, and both the heart and liver are usually more or less involved.

Of all the degenerative or "old age" disorders, chronic Bright's disease is the most stealthy. A middle-aged man or woman can be within a few weeks or months of the grave and be quite unaware of their doom. A vast number of these chronic kidney cases never produce serious or alarming symptoms until their victims are very near their end. This is the reason we urge everybody to submit to an annual medical examination. Years before any discernible symptom would have appeared, the careful examination of the urine together with the blood pressure findings would have served to indicate the slowly oncoming kidney disorder—and would have pointed out the trouble in time to have had something effectual done about it.

KIDNEY FUNCTIONS

The kidneys are engaged in taking poisons and waste matter from the blood and throwing it off in the urine. In the course of twenty-four hours the kidneys throw out of the body from thirty to fifty ounces of waste. If both kidneys were inactive for two days, death would result. While the kidneys are frequently diseased, it is true that they very seldom give rise to any pain. Quacks attribute most pain in the back to disease of the kidneys, causing great alarm, and thus opening the way for the sale of their "cures" and nostrums.

The kidneys excrete a portion of the water contained in the blood, in the effort to keep the blood at the proper con-

sistency. They maintain the balance in the water supply of the body, consequently the more one sweats the less urine will be passed. A decrease in the amount of water drunk will also decrease the urine.

The kidneys are greatly injured and overworked by the eating of too much protein—such substances as meat, dried beans, and cheese. Protein ashes must be eliminated through the kidneys. Alcohol, tobacco, and other narcotics also greatly overtax and prematurely wear out the kidneys. Bright's disease is manifested where these organs have been long overworked, inflamed and so worn out as the result of abuse, that they refuse to do their normal work.

Failure to drink regularly a proper amount of water allows the urine to become highly colored and concentrated; this is very irritating to the kidneys, and no doubt results in more or less injury to these organs. The health of the kidneys, therefore, depends upon the cultivation of the regular water drinking habit.

In both structure and function, the skin and kidneys are much alike. The *sweat-glands* are embedded in the skin and have ducts leading to the surface. Between two and three pounds of sweat is thrown off each day. The perspiratory secretion consists of water holding in solution various excretory principles, the chief of which is urea, which is also eliminated by the kidneys, and is one of the most important excretory products.

THE URINE EXAMINATION

When the urine shows any marked abnormality the test should be repeated at frequent intervals—ranging from every two weeks to every three months. All persons over twenty-five years of age—even when the urine shows up perfectly normal—should have their urine thoroughly examined once a year. When sugar or albumen are present the urine should be examined every two weeks.

It should be remembered that the urine sheds great light upon many important functions and vital activities besides showing the working condition of the kidneys. The urine tells us considerable about the way the liver is doing its work as well as indicating extravagant nerve waste as shown by the breaking down of nerve tissues. It further shows the presence of the indican group in those cases where the bowels

are inactive or tardy. In fact, the whole subject of the patient's nutrition and metabolism is greatly illuminated by a careful study of a more or less complete urine analysis.

1. *Color.* Normal urine is a sort of amber color—sometimes spoken of as some shade of a "straw color." In most of the fevers or highly febrile states, the urine color turns to more of a dark yellow; a marked reddish tinge (not so-called "brick dust" deposit) is suggestive of the presence of blood in the urine—having its origin at some point along the urinary tract. Carbolic acid produces a characteristic "smoky" urine, and this same "smoky" appearance is produced by both tannic acid and the eating of large quantities of rhubarb; it is also found in many cases of acute nephritis—acute inflammation of the kidney.

2. *Odor.* The natural odor of human urine is peculiar to itself—and is commonly called "urinous." In "cystitis" or chronic inflammation of the bladder and when, for any cause, the urine has been long retained in the bladder, the odor may be strongly ammoniacal; while in diabetes the odor is frequently markedly "fruity." A putrescent odor indicates pus—suppuration.

3. *Appearance.* Normal urine is comparatively clear in its general appearance. Urine which presents a "woolly cloud" on standing probably contains an excess of mucus. A "milky" or "ropy" urine suggests the presence of large quantities of pus; while "opalescence" indicates the suspension of myriads of bacilli; and "turbidity" suggests mucus, phosphates, or leucocytes.

4. *Sediment.* The normal, fresh urine does not have a sediment of any sort. A turbid sediment or "turbidity," as already suggested, indicates an increase in mucus content, an unusual amount of phosphates, or the presence of an extraordinary number of leucocytes—white blood cells. A reddish-brown sediment suggests the presence of blood; while a uniform cloudiness points to numerous bacteria. A white cloudy sediment points to pus—although it should be borne in mind that when the urine is neutral or alkaline in reaction that the harmless phosphates yield a white, cloudy precipitate almost identical in appearance with pus sediment. The urates, likewise, when the urine is highly acid, yield the well-known "brick dust" deposit or sediment which is entirely normal for such an acid specimen of urine and perfectly harmless; although

not infrequently used by quacks to unduly frighten their innocent and ignorant victims.

5. *Specific gravity.* After the inspection of the urine is completed the next step is to take the "specific gravity"—that is, to measure its density as compared with an equal quantity of distilled water. The normal urine gives a specific gravity varying from 1.010 to 1.025. 1.020 is commonly regarded as the standard normal. Of course, the specific gravity is going to be directly influenced by the amount of urine passed —by the water drunk and by other conditions of disease and habits of living.

We find an *increased* specific gravity—ranging anywhere from 1.025 to 1.040—in diabetes mellitus, acute nephritis, increased urea, high fevers, shock and collapse.

A *decreased* or low specific gravity accompanies such disorders and diseases as chronic kidney disease, degeneration of the kidney, enlargement of the heart, hysteria, diabetes insipidus, chronic interstitial nephritis, and in numerous functional nervous disorders.

6. *Quantity.* The amount of urine passed in twenty-four hours is closely related to specific gravity and is directly influenced not only by the consumption of liquids, but also, indirectly, by the following conditions and disorders: The amount of the urine is *increased* by hysteria and certain other functional nervous disorders, diabetes mellitus and insipidus, chronic interstitial nephritis and all cases of large serous effusions. The amount of the urine is *decreased* in fevers, acute nephritis, cirrhosis of the liver, broken compensation of the heart, poor kidney circulation and uremia. Increased sweating, catharsis, and diarrhea also decrease the secretion of urine on the part of the kidneys.

7. *Total solids.* The normal amount of total solids for a twenty-four-hour specimen of urine runs anywhere from 40 to 70 grams. 60 grams is taken as the standard normal. Estimated in percentage, this amount equals about 5 per cent. Total solids are *increased* in excess body weight, heavy diet, and after exercise, diabetes mellitus and destructive metabolism from any cause. *Decreased* in old age, rheumatism, uremia, fasting, light body weight, light diet and in interstitial nephritis.

8. *Urea.* The liver is the garbage crematory of the body—it takes numerous harmful, acid substances belonging to the

uric acid group and transforms them into a harmless substance called *urea*. The urea content of the urine, therefore, becomes a valuable indicator of the liver's activity. The average healthy, human liver turns out about 30 grams of urea in twenty-four hours, and this amount is generally accepted as the normal standard, although it may vary from 20 to 40 grams.

The urea output in the urine is *increased* in all cases of fever, diabetes mellitus, in a heavy meat diet, in the resolution process associated with a pneumonia convalescence, and in cases of exudate absorption. The urea is *decreased* in nephritis, uremia, in wasting diseases, when the body is at rest, during a low protein diet, and in all cases of chronic liver disorders or degenerations.

9. *Uric acid* is a substance typical of a vast group of acid bodies which are generated in the animal body by the chemical action of the life-process. Uric acid itself is a relatively harmless substance, but a large number of its chemical relatives and ancestors are exceedingly harmful to the health of the body. It may be remarked in this connection that uric acid does not cause rheumatism and probably has little or no connection with gout; neither do the numerous medicines sold as "uric acid solvents" possess the remarkable powers so often attributed to them by their manufacturers. Plain water is one of the best solvents for all of the body's eliminative poisons.

The uric acid output in the urine is *increased* in all cases of gout, rheumatism, pernicious anemia, organic diseases of the viscera or internal organs, following fevers, leukemia, hepatic degeneration, in all conditions of respiratory insufficiency, and for some time following gouty attacks. The uric acid output is *decreased* in chronic kidney diseases, before gouty attacks and during a low protein diet.

10. *The chlorides.* The chlorides found in the urine are largely derived from the common table salt eaten with the food, and the average twenty-four-hour specimen of urine yields about 10 grams of chlorides, or .85 per cent. Quantities of chlorides much above this standard suggest that the patient has eaten of some unusually salty food or else that they have formed something of a "salt habit"—which leads them regularly to salt all foods excessively.

The chlorides are *increased* in the early stages of most

fevers, in diabetes mellitus and insipidus, following the crisis of pneumonia, in cases of advanced dropsy, and during the absorption of large exudates. The chlorides are *decreased* in fevers, nephritis, pneumonia—before the crisis, in chronic dyspepsia, during large inflammatory exudates and during the early days of dropsy. The absence of chlorides in the early days of pneumonia is regarded as a serious indication.

11. *Phosphates.* In a twenty-four-hour output of normal urine we find about 3 grams (.25 per cent) of total phosphates—2 grams of which are represented by the so-called "alkaline phosphates." These phosphates are very largely derived from the wear and tear on brain cells and nerve tissues, and, as the reader will very readily surmise, become something of an indicator of the extent to which nerve structures were being broken down during the period represented by the urinary specimen.

The total phosphates are also *increased* in fevers, genito-urinary inflammations, diseases of the bone, tuberculosis, and in diseases of the nerve centers; also in a certain functional condition known as "phosphaturia." The phosphates are *decreased* in mental disease, chlorosis, gout, pregnancy and certain renal (kidney) diseases.

12. *Acidity.* The urine examination presents the most direct and available method of estimating the acidity of the body's circulating fluids. The common method of determining the acidity of urine is based on the quality of a standardized alkaline solution required to neutralize the urinary acidity and the end results are designated as degrees. Average, normal human urine shows about 30 degrees of acidity and that amount is commonly accepted as standard; although any urine running from 15 degrees to 40 degrees might be regarded as fairly normal. Of course, this standard presupposes that the test is made on a fairly fresh specimen of urine, as standing may increase the acidity.

Acidity of the urine is increased in fevers, acidemia, lithemia, rheumatism, and autointoxication; *decreased* in malnutrition, cachexia (wasting diseases), chronic cystitis (inflammation of the bladder) and in urine fermentation.

13. *Albumin.* Even the layman understands that albumin is not a constituent of normal, healthy urine. In making the urinary tests albumin is first sought for qualitatively—and if its presence is shown by the usual tests, then steps are taken

to estimate or weigh the albumin so as to know just what percentage is present.

While albumin in the urine is always sufficiently serious to call for immediate investigation and prompt action, nevertheless, it does not always signify Bright's disease. It may indicate an early stage of kidney irritation which dietetic reform will serve to completely remove—cure. If albumin is repeatedly found in the urine and in increasing amounts, there can hardly be but one diagnosis—grave kidney involvement.

The repeated finding of albumin in the urine, then, would suggest one or more of the following diseases or disorders: Bright's disease (especially acute parenchymatous), poisoning by some substance acting on the kidneys, profound and long-continued anemia, one of the many infectious fevers, increased blood pressure, excessive physical exercise, chronic heart disorders, or tuberculosis of the kidneys.

14. *Sugar.* Likewise, most everybody understands that sugar in the urine signifies disease of some sort—usually diabetes in some form. As in the case of testing for albumin, the laboratory tests for sugar are first applied and if this indicates the presence of sugar in the specimen, then procedures may be instituted to collect the sugar and weigh it, so as to know just how much is present and for comparison with future specimens. In arriving at the point of sugar toleration in a case of diabetes, the sugar of the urine will be ascertained in this way once or twice a week—or even daily.

Sugar (glucose) is found in the urine permanently in diabetes mellitus—unless, as a result of dietetic adjustment, it has been brought under therapeutic control. Likewise, sugar appears in the urine in certain diseases of the fourth ventricle of the brain. Sugar may temporarily appear in the urine in certain fevers and after the giving of certain drugs. Immediately after eating large quantities of candy or other forms of sugar, some persons may show a small amount of sugar in the urine and this is spoken of as being "physiological." In certain cases of exophthalmic goiter (Graves' disease) small traces of sugar sometimes appear in the urine.

15. *Indican.* We now come to a group of acid-forming bodies which normally should not be found in the urine, but which are very commonly present—the so-called "indican group," embracing indican, indolacetic acid, etc. These acid bodies are produced largely by protein putrefaction in the intes-

tinal tract and should pass out of the body with the feces; but when produced in extraordinary quantities and when the bowel action is sluggish, large amounts of these injurious substances are absorbed into the blood from which they are subsequently removed by the selective secretory action of the kidneys.

Many authorities believe that indican and its family group are largely responsible for premature senility, for hardening of the arteries and many cases of premature high blood pressure.

Indican is found in all cases of intestinal obstruction, protein putrefaction (autointoxication), chronic phthisis (consumption), empyemia, typhoid fever, and Addison's disease. It also appears in the early stages of cholera.

16. *Bile.* When bile is found it indicates one or more of the following conditions: Defective bile excretion—some obstruction or disorder in the gall-bladder or bile passages—usually accompanied or followed by jaundice; congestion or cirrhosis of the liver; malaria or some other severe fever; or some other disease resulting in the sudden destruction of large numbers of red blood cells.

17. *Blood* in the urine signifies hemorrhage from or into some part of the urinary tract; or, maybe, the specimen was contaminated with blood from another source as in the case of menstruation.

1. It may be due to acute fevers.
2. To acute inflammation of the kidneys or bladder.
3. To poisons, such as turpentine, carbolic acid, and Spanish fly.
4. To stone in the kidney or in the bladder.
5. To a blow over the kidney.
6. To a tumor of the kidney or bladder.
7. To menstruation.

18. *Casts* are always an evidence of irritation, congestion or inflammation in the kidney. They are discovered by means of a careful microscopic examination of the urinary specimen; and, of course, are not found in healthy or normal persons, although certain forms of casts may appear now and then in the urine of persons who are over fifty.

19. *Epithelial cells*—a few—will be found in most specimens of even the most normal urine. When present in large numbers they are indicative of a mild irritation of the kidney.

If the renal irritation is a little more severe—leucocytes will probably also be found; while still more irritation may show blood in the specimen. Blood in the urine does not necessarily involve the kidney, as it may originate anywhere along the urinary tract.

20. *Urinary crystals* indicate an excess of their respective substances in the kidney secretion or changes in the chemical reaction (from long standing, etc.) which have resulted in a precipitation of these substances into crystaline form. Of course, the finding of large amounts of urinary crystals also suggests a tendency to calculi—stones—in the kidney or bladder.

RENAL EFFICIENCY TESTS

In addition to the findings of a complete urinalysis, the efficiency or functional working of the kidneys may be still further tested by means of one or more of the so-called "renal efficiency" tests. A given quantity of some chemical substance which is quite wholly eliminated by the kidneys is given to the patient and then the urine is carefully collected at each voiding and the "test" chemical is thus recovered. In this way, it is readily ascertained just how fast the kidneys are eliminating the "test" and also how long before all of the substance administered is recovered. These findings are compared with the standardized performance of normal kidneys and thus the efficiency of the kidneys undergoing such a test is estimated.

It should be made clear that the kidney efficiency tests together with certain blood examinations are of more value in estimating kidney conditions than casts and albumin in the urine. These renal efficiency tests serve the purpose of showing what the kidneys can actually do—while casts and albumin merely serve to indicate the presence of certain disease tendencies in the kidney. Sometimes a pair of kidneys may turn out to be either better or worse as suggested by the presence of casts and the finding of albumin.

The *blood pressure* is an important item in estimating the actual condition of the kidneys. No matter how good the urine examination may turn out, suspicion should always be attached to the kidneys if the blood pressure remains permanently elevated—especially if the diastolic pressure remains high, say up to 95 or 100.

URINE TESTS FOR ALBUMIN AND SUGAR

To make these tests one requires:

A test tube,
An alcohol lamp,
Some strong nitric acid (white),
A medicine dropper.

1. *Albumin.* About a half-inch of nitric acid is placed in a test tube. The acid is gently warmed over the lamp. It must not be boiled. With the medicine dropper a half-inch of urine is carefully run on top of the warm acid. If a white band forms at the junction line of the two fluids, albumin is present. If albumin is found its presence should be verified by a laboratory.

This test does not show casts. Albumin may be present from some cause other than Bright's disease. Bright's disease may be present when there is no albumin in the urine. These are the exceptions. The rule is that albumin in the urine means Bright's disease.

2. To *test for sugar,* an inch of Haines' solution is placed in the test tube and brought to a boil. Then ten drops of urine are added. If the deep blue solution changes to a muddy yellow or reddish yellow, sugar is present, and the patient has diabetes. If either test indicates anything wrong, the person should seek medical advice.

TREATMENT OF BRIGHT'S DISEASE

In *acute Bright's disease* it is imperative that the patient have absolute rest in bed. Meat and eggs and other foods rich in protein should be avoided or greatly curtailed. Buttermilk or fruit juices with small amounts of cereal should be taken. Baked potatoes and rice dishes are excellent foods when taken in moderation. Alcohol, tobacco, tea, and coffee, and also beef tea and beef broths, should be avoided. Little or no salt should be used in the food. Water should be given freely. Hot baths or packs to produce gentle perspiration are valuable.

In *chronic Bright's disease* if the patient employs the proper régimé they may live for many years. These patients should use little or no alcohol, tobacco, tea or coffee. They should eat moderately of meat and other foods high in protein, but the most important thing is not to overeat. No matter how

ideal the food or how well balanced the diet, if these patients overeat they are going to have trouble.

Victims of chronic Bright's disease should lead a free and tranquil life with a minimum of business worry and anxiety. They should be out of doors as much as possible and in case the blood pressure climbs up suddenly they should go to bed for a few days and live on buttermilk or orange juice.

The skin should be kept warm, a liberal amount of water should be taken daily, and the salt should be kept down in the diet.

Do not depend upon kidney cures or other drugs to cure Bright's disease. They are a snare and a delusion. Bright's disease must be managed by means of hygienic living and moderate activity on the part of the patient.

CHAPTER XXVII

WATER AND ITS INTERNAL USE

Our drinking water is secured from many and varied sources, differing in various localities, cities, towns, and villages; and a thousand and one things conspire to jeopardize the purity of our modern sources of drinking water. The protection of our water supply constitutes one of the great sanitary problems of this age, one—fortunately for the health of the people—which is receiving more and more attention as the years pass.

The majority of the diarrheal diseases of summer, both of infants and adults, together with typhoid fever and cholera morbus, are largely matters of infected food and drink. When visiting in strange places, especially in the country where water is obtained from wells, have it boiled or otherwise purified before you drink it. Be careful how you eat unpeeled fruit or unwashed vegetables which have been exposed to street dust or exhibited in other public places of the city. See that vegetables are thoroughly washed or cooked before eating. See that the milk is fresh; that it has been kept on ice, so as to prevent the undue development of germs. Attend to these matters, especially while you are taking your summer vacation and are exposed to new and, perhaps, unwholesome drinking water and other disease dangers.

CONTAMINATED DRINKING WATER

Rain water is contaminated by atmospheric impurities, dirty roofs, and unclean cisterns. The dangers of contamination to rain water are so great and so many that in cities and villages it is unsafe to use such water for drinking purposes.

While spring water may be contaminated by barnyard filth, or polluted by the nearness of its supply veins to a graveyard, the chief source of contamination of spring water is from its waterbeds resting on or passing over certain poisonous chemicals such as arsenic, iodin, etc.

Well water, especially that from ordinary dug wells, is subject to contamination from the channels through which it flows, or from the sewage of nearby settlements. Amebic dysentery, a grave form of chronic diarrhea, is produced by the presence of certain little animals in the drinking water.

Lake water is frequently contaminated by the sewage of nearby cities emptying into the lake. There is great danger to the city water supply from contamination of lakes or reservoirs. Epidemics of typhoid fever have scourged many cities as the result of the carelessness of a single typhoid fever patient dwelling near the sources of the water supply of the city. The water may be contaminated by germs or by animal excretions, and the only safe course to take when the purity of the water is suspected is to boil it.

Diarrhea and many of the summer complaints of the great cities are due, not alone to impure or contaminated milk, but also to the presence of the germs causing these diseases in the drinking water.

Water is commonly thought to be pure when it is clear and sparkling. The attention of the reader is called to the fact that, ordinarily, sparkling constitutes serious evidence of impurity and contamination.

TESTS FOR DRINKING WATER

The chemical, microscopical, and bacteriological tests for drinking water are, of course, a matter for the trained specialist. But there are a few physical tests which anyone may easily apply.

1. *Color.* The water under examination should be allowed to remain at rest for a time in order that any foreign matter may settle to the bottom of the vessel. The clear water above is then to be poured into a clean glass vessel, and a sheet of white paper is placed behind or below it. In this way the color is noted. To do this properly the glass vessel should have a diameter of at least eighteen inches. If a glass vessel containing distilled water be placed beside it for comparison a better result will be reached. A bluish tinge characterizes perfectly pure water; a grayish tinge is not objectionable; a greenish tinge may result from harmless algae, or water plants; yellowish or brownish hues result from iron salts, peat, animal matter, or sewage.

2. *Clearness or turbidity.* The water should then be well shaken up so as to distribute the sediment, and a printed page should be placed behind or below the glass vessel so as to estimate the depth of water through which the page may be read. If the turbidity does not subside after the water has stood at rest for some time, it is probably caused by finely divided particles of clay.

3. *Sediment.* This may be classified approximately, as: absent, minute, slight, large, or very large. Some idea may also be given of its nature, as: sandy, clayey, reddish; and the presence of any large particles of organic matter, as chips, minute fragments of leaves, grass, etc., may be noted.

4. *Luster.* If highly aerated, the water sparkles. Polluted river or well water, or stagnant water, has no luster—except when certain gases are present—as in waters from highly contaminated sources, such as graveyards, etc.

5. *Taste.* A good tasting water may be impure; but a bad tasting water should be unhesitatingly condemned. Pure water has little or no taste.

6. *Smell.* Slightly heat the water and then observe the odor, or the absence of it. When water is heated, the gases are liberated and the odor is much more pronounced than when cold. A bad odor is another cause for the immediate rejection of a drinking water. But the absence of odor is not in itself a proof of its purity. Generally speaking, a water that is colorless, odorless, tasteless, clear, and free from sediment may be regarded as a fairly safe drinking water.

7. *The fermentation test.* Put some of the water to be tested in a small bottle, and add a pinch of pure white sugar. Place it uncorked in a warm place. If cloudiness appears within two days, the water is too impure to be used with safety. Care must be taken to have the bottle perfectly clean. The cloudiness can be most easily discovered by holding the bottle up against a dark or black background, in a good light.

WATER PURIFICATION

Mechanical filtration is sometimes used for the household and for manufacturing establishments. The water is forced by pressure through earthenware cylinders, and it was at one time thought that these filters would arrest the passage of germs and thus effectively purify the water, but recent investigations have shown that these filters are all more or less a

snare and a delusion. No filter has yet been devised which is thoroughly effective.

The charcoal filters in a very short time become a veritable hotbed for the development of germs. Filtered water cannot be relied upon as being pure; at best, it is but one of the uncertain methods of obtaining pure drinking water.

Boiling is the best method of home purification of impure water. Water should be boiled twenty minutes; better thirty minutes. The only objection to boiled or distilled water is that it usually tastes flat. This unpleasant taste is easily overcome by pouring the water from vessel to vessel, allowing it to pass through the air a few times, as this flat taste is due to the fact that all air has been driven out by boiling. Boiled or distilled water, when properly aerated, posseses a taste in every way satisfactory.

If one cannot get pure soft water from driven wells, or from the mountain snows, or from other satisfactory sources, distilled water undoubtedly represents the ideal pure water, and when properly aerated, as above suggested, is wholly satisfactory from every standpoint.

Emergency purification. In times of flood and other disasters—as well as when camping out or traveling in insanitary localities, the following method of purifying water will be found easy and will render practically any water safe for drinking purposes:

Take a level teaspoonful of fresh chloride of lime and rub it up, until there are no lumps, in a teacup of water. Dilute this with three cupfuls of water, and keep this stock solution in a tight stoppered bottle for further use. A teaspoonful of this stock solution, added to a two gallon pail of water, and well stirred up, will destroy all typhoid or other dysentery producing germs in about ten minutes, and will make the water practically safe for drinking and cooking. If this quantity makes the water taste of lime use a little less, otherwise not. Get the chloride of lime in metallic cases, otherwise it cannot be depended upon to be effective.

The *fruit acids* are also very valuable for disinfecting drinking water in emergencies. At times when water is suspected and it cannot be boiled, or you have no fresh chloride of lime, it is valuable to remember that the juice of one small lemon will almost completely sterilize a glass of water in thirty minutes. Water treated in this way is pretty certain to be free

from typhoid, dysentery, and other infectious diseases, which are commonly contracted through the channel of impure drinking water.

THE INTERNAL BATH

It is just as important to supply abundance of water for the proper bathing and cleansing of the internal parts of the body, as it is frequently to wash and bathe the external skin. The living tissues are just as literally soiled and dirtied by their life action and their poisonous excretions, as is the skin soiled by its excretions of sweat and poisonous solids. Thus the regular drinking of water is absolutely necessary to enable the body to enjoy its internal bath, and this internal cleansing is just as grateful and refreshing to the cells and tissues as is the external bath to the nerves of sensation which exist in the skin.

By both the old and the young, water must be taken regularly and in proper amounts. Even young children and infants but a few days old should regularly receive small quantities of water. Infants frequently cry for water, and receive food instead, which deranges their digestion and upsets their nutrition. There must be a regular intake of water from the cradle to the grave.

While some animals, like the camel, are able to go for long periods with but a little water, man does not belong to that class. He requires a regular intake of liquid to correspond with the amount which is thrown out from the body through the various channels of elimination.

The free drinking of water greatly favors the elimination from the system of the products of waste. It not only increases the quantity of fluid eliminated by the skin, the kidneys, and the liver, but also the amount of solid matter.

It is believed that free water drinking helps in the prevention of kidney stones.

DAILY REQUIRED WATER

The total amount of water necessary varies according to the nature of one's work, the amount of sweating from the skin, the moisture of the atmosphere, the amount of water in the food, etc. We believe the average person requires about eight glasses of liquid a day; that is, about two quarts. (By the word "glass" we refer to the ordinary glass or goblet, two of

which equal one pint.) The Japanese, in the practice of their jiujitsu system, drink a gallon of water a day. This is probably in excess of the amount required by the average person of sedentary habits, who does not take vigorous physical exercise.

Water is continually passing from the body. The dry air entering the lungs absorbs it from the moist surface of the pulmonary mucous membranes. A large amount is lost by evaporation from the skin, while the kidneys remove a considerable quantity. Through still other channels water is removed, aggregating, in all, the amount of five pints in twenty-four hours, in the average individual. This loss must be made good, and Nature expresses the demand for water by thirst.

Water is the only substance which will fully quench natural thirst. Beverages which contain other substances are useful as drinks just in proportion to the amount of water which they contain, and are undesirable as ideal beverages, just in proportion as the added elements are injurious.

The fad of drinking several quarts of water a day is a silly practice—it does no good—possibly really harms certain individuals.

HOW TO DRINK

The majority of people need to cultivate the habit of regular water-drinking. As a rule, Americans drink too little pure water and too much of nearly every other kind of liquid. Enormous quantities of soft drinks, soda waters, and other artificial beverages, from the weakest soda pop up to the strongest alcoholic beverages, are consumed, much to the detriment of the consumers; whereas, the regular habit of pure water-drinking would have proved of inestimable value to the health of all. Ordinarily, it is best to drink about one glass of water at a time.

There is great danger in taking large quantities of cold water or ice water when one is overheated or greatly exhausted. At such times, cold water should be slowly sipped to permit of its being partially warmed while passing through the mouth and down the throat to the stomach. The best temperature for drinking water is that at which it is found in wells and springs, or a little above, say, from 65° to 75° F.

While patients suffering from slow digestion and too little acid are advised not to drink much in connection with their

meals, those who are bothered with too much acid, sour stomach, heart-burn, etc., are strongly advised to drink from one to two glasses of some liquid at meal time—preferably cold water. Cold liquids—or even hot soups—are highly beneficial in lessening and diluting the acid which causes these persons so much trouble. About one-fourth of our patients are advised not to drink at meals; about one-fourth are ordered to drink at meals; while the remaining half—those who have no digestive disturbances—are allowed to do as they choose, as it makes little difference to their health, whether they do or do not drink at their meals.

It is because there is too little water in the blood stream, owing to insufficient water-drinking before meals, that some people are seized with such uncontrollable thirst during meal time.

The daily program for regular water-drinking for one who eats three meals a day should run as follows:

From one-half to one glass of water on rising.

Two or three glasses in the forenoon taken about one hour apart—say 9:30, 10:30 and 11:30. Or a glass or a glass and a half might be taken at 10 and 11 o'clock.

The same allowance of two or three glasses taken in the afternoon—say at 3, 4 and 5 o'clock.

Most people will also want some water after the evening meal, taking a glass between 8 and 9 o'clock, or at bedtime.

There are many things which modify the amount of water that should be taken, as previously explained; but the above program represents a systematic scheme for cultivating the water-drinking habit, adapted to persons of ordinary sedentary or indoor employment, such as business men, housewives, etc.

WHAT TO DRINK

Pure, unadulterated water is the ideal beverage, adapted to quench the natural thirst of the healthy man perfectly. Pure water is colorless, odorless and tasteless. It should contain no foreign substance, animal matter, or mineral element.

The addition of sugar, flavoring extracts, ginger or other condiments, alcohol, tea, coffee, cocoa, or chocolate, constitutes adulteration of water and detracts from its value as an ideal health beverage. It results in the cultivation of an unnatural taste. Thousands of people detest water, and will not drink it if they can obtain any other liquid. Such persons

need to reform their taste and train their thirst to appreciate water, just as the appetite must sometimes be trained to appreciate and enjoy pure and simple food.

Fruit juices. In the condemnation of so-called artificial beverages, an exception should be made of the fruit juices. The fresh, unfermented juices of various fruits come very near being pure, distilled water, as they consist of only a little fruit sugar and acid, together with small amounts of flavoring and coloring substances, dissolved in pure water. None of these substances contained in pure fruit juices needs to be digested. While they are foods, they are predigested by the sunshine in Nature's own laboratory, so that unfermented fruit juice is a genuine food-beverage, satisfying the demands of thirst by means of its distilled water, and contributing its sugar and acids as foods to the body without in any way taxing the digestive organs.

Lemonade, not too sweet, and taken in moderate quantities, is certainly a beverage free from objection when used by individuals in ordinary health. And so fruit or fruit juices can partly take the place of water in the daily requirement of liquids. There is absolutely no foundation for the popular prejudice against fruits and melons as a cause of summer complaints, or when eaten late in the fall, as a source of malarial fever, etc. Unripe or overripe fruits frequently cause bowel disturbances; as also do the millions of germs which lurk upon the outside of fruits, and which find their way into the stomach and bowels when these fruits are eaten raw without washing or paring.

CHAPTER XXVIII

THE HEART AND BLOOD VESSELS

The heart may be described as a hollow muscle, having four cavities, two on each side. Its action is that of a double pump, intended to carry on the circulation through the body and through the lungs; the auricle and ventricle on the left side being devoted to the former, and those of the right side to the latter. Each *auricle* is connected with its corresponding *ventricle* by an opening guarded by valves which open for the blood to pass in the right direction, while any attempt on the part of the blood to return is instantly prevented by the prompt closing of these valves. Should these valves become disabled so that they perform their function imperfectly, there will be *regurgitation,* or return of the blood, which occasions serious derangement of the circulation, and indicates organic heart disease.

The heart muscle gets its rest during the pause between contractions, thus doing active work during eight hours of the twenty-four. In fevers, the heart has less time to rest, owing to its more rapid beating, and so becomes exhausted by overwork.

All the blood of the body (or a volume equal thereto) passes through the heart every minute. The arteries—the blood vessels leading out from the heart—have been estimated to represent a length of about one thousand miles. The skin is richly supplied with capillaries containing about ten thousand square feet. The heart does a work every twenty-four hours equal to lifting about one hundred and twenty-four tons one foot high.

HEART DISEASE INCREASING

While there are many forms of heart disease which are responsible for the death rate charged up to heart disorders, the one that concerns us most is heart failure—failure of the blood pump, owing to arterial degeneration and its consequent high blood pressure.

When the blood pressure steadily mounts upward, eventually one of two things happens; either the pump—the heart—will give way, or the blood vessels—the more or less hardened arteries—connected with the pump, will burst. This bursting of the blood vessels usually takes place in the brain and is properly known as a "stroke" of apoplexy, and the resulting paralysis on one or both sides of the body is due to the pressure of the accumulating blood clot on the brain centers. During the last year for which we have official reports there were 198.4 deaths per 100,000 of population in the United States from heart disorders—the highest death rate for any disease. It means that practically one person out of every 500 died of some form of heart disease.

Furthermore, this rate increased from 159 to 198.4 in ten years. No other cause of death is mounting with comparable rapidity. Since very few persons less than 40 years of age die with heart disease, and since both the heavy death rates and the larger populations are in the younger years, the heavy heart disease rate means that the chance that any man over 40 will pass away from heart disease is very great.

EARLY SYMPTOMS OF HEART DISEASE

Most of the groundwork for heart disease is laid down in childhood. When young adults are systematically examined, as is done now on entrance to college, it is found that a large proportion have heart murmurs. These subjects deny that they have ever had heart disease or that they have any symptoms of it at the time of examination. When closely questioned, they tell of having had rheumatism or St. Vitus' dance, or some eruptive disease, but they thought recovery had been complete.

The early symptoms of heart disease are:

1. Shortness of breath. Inability to get one's "second wind" as readily as the average person.

2. Swelling of the ankles—particularly if the ankle "pits" on pressure. This swelling is more prone to appear in the evening.

3. Rapid, palpitating or thumping heart. These symptoms may or may not be evidence of heart trouble—they may arise from nervousness or indigestion, but they should be investigated.

4. Pain in the heart region—especially if it is severe and

"vice-like." In persons over 50 years of age this may indicate the coming on of angina pectoris.

There are certain symptoms which cause many people to think they have heart disease, but which no one should worry about. Among these are:

1. Pains in the chest and particularly around the heart.

2. False angina or radiating pains around the chest and down the arm occurring in persons under 40.

3. Palpitation of the heart not following exertion.

4. Coldness of the hands and feet, feeling of numbness or "going to sleep" of the hands and feet.

5. Ordinary dizziness and "swimming of the head," rushing of blood to the head, hearing the heart pound in the ears or feeling it pulsate in the abdomen.

Most of these symptoms are of no great significance. They do not indicate heart disease.

CAUSES OF HEART DISORDERS

The responsibility for the alarming increase in heart diseases rests upon a number of influences, chief of which are:

1. Loss of sleep. The tendency to keep the heart working without sufficient rest.

2. Excitement, strenuous auto driving, noise, startling amusements, thrills and adventure.

3. Overeating and overstimulation together with over-seasoning of food. Indigestion and chronic constipation.

4. Too much tobacco, tea and coffee.

5. Too much alcohol and patent medicines.

6. Overwork, too much competitive athletics, too much dancing, too much of the modern strenuous life.

7. Gambling, speculation and other business and domestic worries.

8. Unwillingness to endure the slightest pain; therefore the increasing use of aspirin, headache powders, and the numerous coal-tar compounds.

9. Infectious disorders of the mouth, teeth, throat and other organs.

10. We must not overlook the fact that some individuals have hearts that are abnormally slow or rapid—the disorder is constitutional—hereditary.

11. Causes of heart failure are:

a. Muscle weakness of rheumatic, syphilitic, arteriosclerotic, or nephritic origin.
b. Drugs, especially tobacco.
c. Nervous influences.
d. Overexertion and strenuous living.

12. *Types of heart disorders.* In a study of several thousand patients coming to the hospital and presenting heart disorders of some kind as the chief complaint, the following were found to be the causes, in the order of frequency named:

1. Rheumatism—focal infection.
2. Nephritis—Bright's disease.
3. Arteriosclerosis—hardening of the arteries.
4. Syphilis.
5. Nervousness and other doubtful causes.
6. Goiter.

THE BLOOD VESSELS

The blood vessels consist of arteries, veins and capillaries. The *arteries* carry the blood away from the heart to various parts of the body, and consist of three distinct layers—a delicate inner lining called endothelium, with middle and outer layers of muscular, elastic and connective tissues. The *veins* are not so strong as the arteries; their walls are so weak that they ordinarily collapse when cut crosswise. The larger veins contain numerous valve-like arrangements to prevent the back flow of the blood. The *capillaries* are a system of small blood vessels, which connect the arteries with the veins. Like the arteries, they also possess contractile power.

The *vasoconstrictor* nerves pass to the muscular coats of the arteries and veins, and, when stimulated, cause the muscles of the blood vessel to contract, and in this way the vessel is constricted—diminished in diameter.

The *vasodilators* have an opposite effect. By their action the flow of blood to the heart is quickly and easily controlled. They also have a great deal to do with the regulation of blood pressure. So we see that the vasomotor nerves are sort of "stop-cocks" and "safety valves" in the blood vessels.

Blushing is due to the dilatation of the small arteries of the face from the effect of certain emotions upon the vasomotor center in the brain. The paleness due to fright and extreme rage results from contraction of the small arteries induced in the same way.

The *lymph vessels* really have no individual structure. They are simply spaces between the tissues, which permit the collection of lymph, and serve to conduct it back to the blood vessels.

CIRCULATORY SYSTEMS

The movement of blood through the body is divided into four distinct and separate systems as follows:

1. *The pulmonary circulation.* The blood is emptied by the venous system into the right side of the heart. Passing, while the heart is at rest, from the right auricle to the right ventricle, it is forced by the heart's contraction into the vessel leading to the lungs—the *pulmonary artery.* After the blood has circulated through the lungs it is gathered up by the other capillaries, and vessels which form the *pulmonary vein,* and that vein in turn discharges the purified blood into the left auricle of the heart.

2. *The systemic circulation.* During the resting stage of the heart, the pure blood of the left auricle passes into the left ventricle, and, during the heart's contraction, is forced into the *aorta*—that great arching artery of the chest, which sends blood vessels upward and downward, to branch and rebranch to every part of the living body.

As the blood leaves the capillaries and enters the veins, it has lost its bright red color, which means that it has lost its oxygen. The smaller veins leading from the capillaries unite to form larger veins, which join to form the *venae cavae,* which empties the blood into the right side of the heart, thus completing its circuit through the body.

3. *The portal circulation.* The liver is the filter of the body. All the blood which is gathered up from the stomach, bowels, pancreas—the organs of digestion—the blood which is liable to be poisoned or contaminated from bad foods or indigestion, is carried by means of a special set of blood vessels uniting to form the *portal vein,* which in turn, empties into the liver. The blood is filtered through the liver, after which it is again gathered up, as in the case of the capillary system of the lungs, and carried by the *hepatic vessels* back into the general circulation.

4. *The lymphatic circulation.* As the blood flows through the capillaries, its liquid portion (all except the blood cells) passes through the capillary walls—actually leaks out—and circulates about the individual cells and tissues, bathing them

with its nourishing substances. This *lymph* or serum must find its way back into the blood stream after it has yielded up its food substances to the cells and has taken up from the cells their poisonous excretions. The *lymph channels* serve this purpose. They are really spaces between the tissues and cells. They grow larger and larger as they approach the region of the heart, and empty this serum into the veins, where it is again mixed with the blood and carried to the heart.

SLUGGISH CIRCULATION

Some persons, especially the tall nervous type of individual, even though they may have a perfectly normal, sound heart, suffer throughout a lifetime from sluggish circulation, from chronic cold hands and feet. These are the people unfortunately that suffer from hot heads and cold feet, instead of having the more normal combination of a cool head and warm feet. Let us make it clear that some persons have cold feet who have otherwise good circulation. For some reason there is a peculiar contraction of the small blood vessels in the feet and hands. This condition is sometimes constitutional, we might say, temperamental. At other times it is due to disturbances of the sympathetic nerve centers, and may be caused by stomach trouble, constipation, autointoxication, etc.

Sometimes irritant substances will circulate in the blood and will not produce spasm of the small vessels except in the case of the hands and feet. Sometimes this condition is chronic, more or less persistent. In other patients it comes and goes. The hands may be warm one instant and cold at another. These are the cases of pure nerve irritation.

Cold feet are common to those who are feeble, aged, or who have just gone through some exhausting sickness. Of course, we always have poor circulation in the extremities in connection with any form of organic heart disorder.

Persons who suffer chronically from cold hands and feet are usually subject to frequent colds and, of course, in times of exposure they are more likely to contract pneumonia or in other ways suffer from results of wet and cold.

One thing is certain, women and girls who are affected with this condition should not wear low shoes and thin silk stockings throughout the winter season. It seems unwise to tempt Providence by such utter foolishness. If we are victims of this sort of disturbed circulation, let us at least show com-

mon sense in the way we dress the lower extremities in midwinter.

About the only thing, aside from care to the general health and attention to bowel elimination, that can be done by these victims of cold feet is to take the alternate hot and cold foot baths to encourage the activity of the blood vessels in the lower extremities. This is done by getting a vessel of water just as near the boiling point as the skin of the feet will tolerate, and another vessel filled with ice water, or as cold as possible. Put the feet first in the hot water for a few seconds and then dip them into the ice water or cold water, and then back into the hot water. Keep this up until anywhere from 25 to 30 changes have been made, dipping them into the cold water last and then quickly and thoroughly dry. This is a treatment in many cases that will improve the circulation of the blood in the feet. The same procedure can be used with advantage in the treatment of cold hands. Moderate exercise of various sorts, particularly walking, is also helpful in treating cold feet.

CHAPTER XXIX

THE BLOOD AS AN INDICATOR OF DISEASE

The examination of the blood serves to disclose the presence of numerous diseases. A study of blood embraces many investigations among which the following are of greatest value:

1. Hemoglobin is the coloring matter of the red blood cells, and consists largely of iron. When the hemoglobin is below normal, the patient feels run-down and fatigued. They should eat more liberally of the following foods which are rich in iron—their value is indicated by the order in which they are named: Yolk of egg, outer leaves of cabbage, apples, cherries, lentils, strawberries, carrots, spinach, oranges, tomatoes, bran and potatoes (especially the skins and outer portion).

The normal hemoglobin of human blood is set down as 100. Hemoglobin is *increased* by concentration of the blood, cyanosis, diarrhea, high altitudes and relatively increased in pernicious anemia. Hemoglobin is *decreased* in all secondary anemias, malignant diseases, chlorosis, intestinal parasites, splenic anemia, leukemia and Hodgkin's disease.

2. The *color index* is a ratio or comparison worked out between the hemoglobin findings and the number of red blood cells, and the normal is one. Minor variations below one may be found in feeble or sedentary persons. Color index is more markedly increased in pernicious anemia and decreased in chlorosis and other forms of anemia.

3. *The red cells.* The normal red cell count for men is about 5,000,000 cells in each cubic millimeter. The average normal for women may be a trifle lower, some authorities giving it as low as 4,500,000.

When a great reduction in red cells occurs it is indicative of some form of primary or secondary anemia. Red cells are *increased* in high altitudes, diarrhea and heart disorders with cyanosis. They are decreased in all anemias, leukemia, late Hodgkin's disease and in hookworm disease.

4. *The white cell count.* The next step in the microscopic blood examination is to make a careful count of the white cells. There are six or eight different kinds of these white blood cells, which, taken all together, constitute the body's mobile forces of defense against hostile microbic invasions—they are the "standing army of the interior." In the average healthy individual the white cell count shows about 7,500 of these different sorts of white cells in each cubic millimeter of blood, and this is taken as the normal standard.

When the body is engaged in a fight with some infectious malady the number of white cells is often enormously increased. When such an increase is above 10,000 per cu. mm. it is spoken of as a "leucocytosis." A decrease in the white cell count at such a time indicates a lowered vital resistance.

White cells are *increased physiologically* during digestion, after cold baths, during pregnancy, and in the new born; and *increased pathologically* in all inflammations and infections (except in walled off abscesses, mumps, malaria, influenza, typhoid and measles), in mixed tubercular infections, leukemia, and in 50 per cent of malignant diseases—especially sarcoma. The white cells are *decreased* in chlorosis, pernicious anemia, and low vital resistance.

5. *The Wassermann test.* In addition to the regular blood tests already described, numerous special tests are made for determining the presence of certain suspected diseases; and prominent among this group is the Wassermann test. This test represents the best means, in the nature of laboratory technique, which we have at our disposal for detecting the presence of a syphilitic infection. The routine employment of this test has served to teach us that many persons are unknowingly suffering from this grave disorder, having been innocently infected through drinking cups, drinking fountains, towels, or eating utensils.

6. *Complement-fixation.* This is a complicated test designed to indicate the presence of a suspected infection in the system. It is chiefly used at the present time in detecting a latent or uncured gonorrhea and represents one of the most valuable methods of ascertaining if any given case of this venereal infection is wholly cured or not. Just as no infected person should marry until the Wassermann test has been negative for two or three years; no gonorrhea patient should marry, and thus expose the innocent to a dangerous infection until the

complement-fixation test (in addition to certain microscopic and other examinations) shows the individual to be free from the active infection of gonorrhea.

7. *Coagulation time.* In all cases examined the coagulation time of the blood should be ascertained. This information is of special value in case any surgical procedures, even of a minor nature—such as removal of the tonsils—are subsequently found to be necessary.

THE SIGNIFICANCE OF BLOOD FINDINGS

The information to be secured from a careful examination of the blood is so vast that it ought to be a part of the regular annual health audit of well people. That is, we should have the blood examined once a year at the same time the blood pressure is taken and the urine examined.

On the other hand, in connection with suspected disease, the blood is equal in importance with the urine from the standpoint of the information which it yields. In some cases it is even more important than the urine examination. For instance, in the case of chronic wasting diseases in which malaria is suspected or in case of acute attacks of chills and fever, the diagnosis can only be made sometimes with certainty by finding the malarial parasite in the blood cells.

In the case of suspected appendicitis, when in doubt as to whether immediate operation should be performed, the examination of the blood will often control the decision, showing with considerable reliability as to whether or not an abscess is in process of formation. The blood examination is a very reliable guide as to the presence and severity of infections in the body and also as to the nature of the reaction on the part of the body in its efforts to resist this infection.

In all cases of pallor, poor health and loss of weight, the blood examination is of value in that it shows the nature and severity of the anemia. The blood findings are also of value, taken in connection with other evidence, in the diagnosis of cancer.

When certain abnormal cells are found in the blood (eosinophiles) it is a suggestion that the individual is infested with worms or parasites of some kind, probably in the intestinal tract.

The blood findings are diagnostic in such diseases as pernicious anemia, leukemia, etc.

In our large cities there are many laboratories which do this work, and while the patient may secure blood analyses, as they can urine analyses, independent of a physician, it is not merely the test they want, but it is the advice which can be given along with the interpretation of these findings that is of greatest value to the patient. Have your doctor make these examinations for you, and then he can sit down and tell you what they mean and give you practical advice deduced therefrom.

BLOOD PURIFIERS

There is a deep-seated notion in the minds of most people that the blood needs purifying at springtime; and for this purpose vast quantities of sarsaparilla and other patent medicines are swallowed by the victims of sluggish livers, despondency, constipation and autointoxication, in the vain hope of purifying the blood and thereby escaping some of the afflictions peculiar to the return of the warm season.

No greater delusion was ever connected with the subject of heath and disease than that of blood purifiers. One cannot purify the blood by putting some ill-tasting or bad-smelling drug into it. The blood must be purified by the intelligent eating of pure food and the liberal drinking of pure water, and by the proper action of skin, kidneys, lungs and liver. These are the measures by which the impurities found in the blood are excreted and eliminated from the body.

The blood must be purified by getting rid of its impurities. If the blood is supplied with only pure food and pure water; if the process of digestion is kept healthy, and the stomach and bowels are free from rotting masses of food, nature will quickly purify the blood by casting out the solid impurities through the kidneys, by passing out the liquid poisons through the skin and bowels, by throwing out the gaseous poisons through the lungs, and finally by sifting and modifying the residue by the wonderful filtering powers of the liver.

One of the best possible means of purifying the blood is to subsist upon a fruit diet for three or four days. Three or four times a day eat liberally of fresh, ripe fruit. This is probably the best known means of quickly and thoroughly cleansing the blood stream. Pure, unfermented fruit juice is valuable for this same purpose, and may be used for two or three days.

This is a good practice in springtime for those who have foul breath, coated tongue, dyspepsia, biliousness, constipation, etc. The old practice of giving sulphur at springtime was not so bad, as sulphur is a laxative and serves to clean out the bowels thoroughly.

CHAPTER XXX

BLOOD PRESSURE AND HARDENED ARTERIES

The blood pressure, owing to hardening of the arteries, has a tendency to get higher as we grow older. Blood pressure is the test of the activity, condition and elasticity of the heart muscle and the arteries.

When a life insurance company issues a policy on a man's life it does it on the basis that he will live out a certain life expectancy. One life insurance company found that the death rate among a group of insured men who had an average blood pressure of 143 was but 47 per cent of the expected death rate. In a group with a pressure of 150 or over, the death rate was 70 per cent of the expectancy. On the other hand, in a group of people who were rejected and whose average blood pressure was 171, the death rate turned out to be 153 per cent of the expectancy.

THE CIRCULATION FORCES

The heart, although the chief, is not the only active agent in the circulation of the blood. Other forces share in this important work, the principal of which are:

1. *The heart.* The force exerted by the heart amounts to about seventy-five pounds each beat; and although this force is sufficient to propel the blood to the capillaries, so much friction is produced by the immense surface over which the blood passes in the capillaries that additional force is required. The heart serves as the great regulator of the circulation, constantly beating, yet ever changing its beat; pumping sometimes fast—at other times slowly; constantly altering its action to suit the needs and requirements of the body.

2. *The arteries.* The contraction of the heart, which gives the blood a propulsive impulse, is followed up by the contraction of all the arteries. The small arteries are supposed to be specially active in assisting the circulation. Some observers

claim that the small arteries or arterioles keep up a constant peristaltic or milking action, by means of which the blood is urged forward.

3. *The capillaries.* While the capillaries themselves are more or less passive agents, the passage of the fluid part of the blood through their walls must occasion a capillary action similar to that which causes the rising and circulation of sap in trees and plants.

4. *The muscles.* The veins are so placed among the muscles that whenever contraction of the muscles occurs they are compressed, and the blood which they contain is necessarily displaced. As it cannot pass backward, on account of the valves which close whenever a backward current is established, it must of necessity move forward. Contraction of a muscle has essentially the same effect upon it that squeezing has upon a sponge filled with water.

5. *Temperature.* It is probably true that in certain parts of the body, at least, the elevation of temperature which the blood undergoes in the capillaries aids the circulation by increasing its volume, the pressure of blood from behind compelling expansion in one direction, toward the veins.

6. *The lungs.* The lungs operate with considerable force in aiding at least a portion of the venous circulation. When the chest is expanded, and while it is filling with air, the pressure being partly removed from the large veins which pass through the chest, the blood rushes in to fill them. In this way much assistance is afforded, especially to the circulation of the blood in the liver.

WHAT IS BLOOD PRESSURE?

Blood pressure is the name given to the tension or pressure which exists in the arteries of the body and is regulated and maintained by the force of the heart's action and numerous other lesser influences.

This pressure is known as "systolic" pressure and "diastolic" pressure. *Systolic pressure* represents the arterial tension at the maximum of the heart beat—the cardiac contraction—and is the pressure which is detected by the old fashioned method of observation at the wrist; and when an individual's blood pressure is spoken of as being 130 or 150, reference is made to this systolic pressure.

The *diastolic pressure* represents the arterial tension at the

minimum—at the middle of the cardiac rest—as it were, between beats, and can be reliably secured only by the newer methods of stethoscopic examination.

The *pulse pressure* represents the strain on the circulation mechanism during the blood pressure variations from systolic to diastolic.

Pressures are taken with patient in sitting, lying and standing postures with the cuff on the left arm. The blood pressure machine has an attachment which can be strapped around the arm, so that by means of pumping air into a little rubber bag underneath, pressure can be applied to the blood vessels. The pressure is now gradually removed until the pulse can just be felt at the wrist, and then on the indicator is read off how many millimeters of mercury are equivalent to the blood pressure. This technique gives only the systolic pressure. The more modern method of observing blood pressure is carried out in the same general way, except that, instead of depending on the sense of touch for detecting the return of the pulse at the wrist, a special form of stethoscope is attached to the patient's arm at the bend of the elbow and both the systolic and diastolic pressures are in this manner much more accurately and precisely obtained. The reader is, no doubt, more or less familiar with this technique from personal experience.

An ordinary healthy person has a blood pressure between 110 and 130 millimeters of mercury; and under normal conditions, blood circulating at this pressure is able to find its way into all parts of the body and properly nourish every cell.

BLOOD PRESSURE STANDARDS

The so-called "normal" or "average" blood pressure standards are, in my opinion, especially those for men, a little above the *actual normal.* In other words, the average blood pressure is probably a trifle above normal. The standards given here are the "average" findings—and those generally accepted by medical authorities as representing the "normal."

The normal blood pressure for men at twenty years is 120 millimeters of mercury. The normal pressure for women at twenty years is about 110 millimeters. The lowest normal limits are 95 for women and 105 for men.

There is a normal variation in blood pressure of about 30

points (millimeters); that is, the pressure may run 15 points above or 15 points below the average normal for any given age without being considered abnormal. Therefore, at twenty years of age a man's pressure might range from 105 up to 135, without suggesting disease; while a woman's pressure, at the same age, might run 95 to 125.

The blood pressure rises one millimeter (1 point) for every two years' increase in age. Women at any given age exhibit a pressure about 10 points below that of men of the same age. High pressure become dangerous when it reaches 185 or 190. Blood pressure usually falls a trifle after ninety years of age. It should be remembered that one-third of all cases of arteriosclerosis exhibit a normal blood pressure, at least in their earlier stages.

THE DIASTOLIC BLOOD PRESSURE

This, as already explained, is the pressure present in the arteries while the heart is in a state of rest—between beats. If the systolic pressure is 120, then the normal diastolic pressure would be about 80. In many respects the diastolic pressure is of more importance than the systolic. The diastolic pressure should normally run about two-thirds (70 per cent) as high as the systolic. (When the normal individual is at rest, it may run as high as 75 or 80 per cent of the systolic pressure.)

At twenty years of age the normal diastolic pressure runs about 80 millimeters for men and about 75 millimeters for women. The range of safety for the diastolic blood pressure —for both men and women—runs 70 to 90 mm. A diastolic pressure much below 70 mm. demands attention; while a continued diastolic pressure of 95 mm. or above must be regarded seriously.

The *pulse pressure* represents the pressure variation in the blood vessels during one complete cycle of the heart's action. It is estimated by subtracting the diastolic pressure from the total or systolic pressure. If the systolic pressure is normally 120 and the diastolic 80, the normal pulse pressure in such a case would be 40. Pulse pressure runs about one-third (30 per cent) of the total or systolic pressure; and represents the difference between the systolic or heart working pressure and the diastolic or heart resting pressure. In healthy individuals 20

years of age the pulse pressure may vary from 35 mm. up to 45 mm. These so-called normal variations are increased in the case of the older people.

BLOOD PRESSURE VARIATIONS

Exercise and nervousness tend to increase the pulse pressure disproportionately. Walking may increase pulse pressure even while decreasing systolic pressure. Pulse pressure is high in aortic regurgitation and low in mitral stenosis and myocarditis.

When the pulse pressure and the systolic pressure are increased proportionately, the trouble is probably in the heart; otherwise, it is a matter of nervous tone in the vascular mechanism. A high diastolic pressure is usually present in chronic alcoholism.

The following influences and conditions are able to produce variations in blood pressure which must be regarded as entirely normal: age, sex, size, obesity, temperament, time of day, digestion, muscularity, exercise, fatigue, posture, rest, sleep, excitement, nervousness, fear and barometric pressure.

Chronic bronchitis, cerebral tumor, neurasthenia, psychasthenia, hysteria, insanity, pleurisy, asthma, neuralgia, rheumatism, obesity and epilepsy are representative of a group of disorders which produce great variability in the blood pressure findings.

The high pressure of fear, worry and nervousness can sometimes be almost instantly relieved by psychotherapy. In this form of high tension the increased pressure is chiefly systolic, as the mind seems to be able to exert little or no influence over the diastolic pressure.

In some nervous states—those of brain fag and exhaustion—there is usually a subnormal blood pressure; while in other nervous states, as already noted, the blood pressure is exceedingly variable and changeable. It is highly important in studying and treating the blood pressure disorders, to be able to distinguish between organic causes of high and low pressure and those influences which are wholly or partially functional—nervous.

Many students of blood pressure have pointed out the fact that a patient's pressure varies greatly as compared with posture. This is not only true; but, study of these blood pressure variations in connection with the pulse ratio yields valuable

information regarding the "vasomotor tone"—the circulatory equilibrium.

Careful observation of a large number of patients and by numerous clinicians have shown that there is a direct relationship between the increase of the pulse rate and the rise or fall in blood pressure when a patient is tested first in the lying down posture and then in the standing up position.

HIGH PRESSURE HABITS AND PRACTICES

Civilized peoples engage in numerous practices and indulge in various habits which have a tendency to elevate blood pressure. One of the results of the use of cocain is to raise the blood pressure and produce a feeling of exhilaration and well being, but the more common practices along this line may be summed up under the following heads:

1. *Tobacco.* Tobacco stands foremost among the common causes of increased blood pressure. It is well known that when a young man takes his first smoke, he is pale in the face; the small blood vessels of the skin are strongly contracted; the blood is forced upon the internal organs. The blood pressure, if taken at such a time, is found to be considerably elevated; and so throughout life the effect of tobacco using, due to the specific action of the nicotin and other poisons, is that of directly raising the blood pressure. A single cigar raises blood pressure for over one hour in some individuals. Excessive tobacco using may sometimes produce a "tobacco heart," and thus contribute to a secondary low blood pressure. The excessive use of tobacco, then, may be regarded as one of the causes of increased blood pressure in the present generation.

2. *Tea and coffee.* The caffein of coffee and the thein of tea are narcotic poisons which may exert an indirect influence in elevating the blood pressure when taken into the system. There is used in the United States over a billion pounds of tea and coffee a year. This tea and coffee drinking is none the less a case of drug addiction, even though it be taken at meal time, and notwithstanding that its use has become well nigh universal.

3. *Overseasoning.* It is believed that the free use of all the condiments which are commonly used by Americans, with the exception of common table salt, nutmeg and cinnamon, may have some influence in raising the blood pressure, to say nothing of their deleterious effects upon the digestive system.

Overseasoning foods leads to overeating—and overeating is undoubtedly one of the leading causes of increased blood pressure.

4. *Flesh foods.* The American people, in common with their English cousins, eat too much protein. All forms of flesh food contain certain irritating substances which were circulating through the flesh of the animal at the instant of death, and which are swallowed along with the meat, and have power to raise the blood pressure considerably, by their irritating effects upon the tender linings of the blood vessels and their influence upon the nervous system.

5. *Autointoxication.* When an excess of food is taken into the digestive tract, the machinery of digestion is clogged; fermentation and putrefaction are favored, especially if this excess is largely protein; and, as a result, there are generated poisons which raise the blood pressure.

Autointoxication means self-poisoning, and refers to special poisons which may be produced in the body due to the derangement of digestion and metabolism, as in intestinal putrefaction. The colon of man is inhabited by untold billions of germs (colon bacilli) and these secrete a toxin or poison which has a tendency to harden the blood vessels and indirectly to raise blood pressure. The same is true of the toxins of the various disease germs.

6. *Exposure and toxins.* By long continued exposure of the skin, the blood is driven from the cutaneous vessels, as evidenced by the pallor and goose-flesh appearance. This forcing of the blood upon the internal organs greatly raises the blood pressure.

The toxins which flood the system during and after an attack of influenza, tonsilitis, cold, pneumonia, rheumatism, etc., are all able to harden the arteries, raise blood pressure, and thus lay the foundation for Bright's disease. Syphilis is a leading cause under this head.

7. *Anxiety and anger.* Either of these mental states have been found to result in materially raising the blood pressure. Worry is a foe to health. Anxiety is a mental poison that in many respects exerts the same deleterious effect on the body as do literal poisons introduced from without. Those who would avoid high blood pressure must avoid grief and depression.

It is a well known fact that victims of high blood pressure

often burst a blood vessel during a fit of anger. Numbers of people have met their death in this way. This is due to the fact that anger and other intense emotions have power, through the nervous system, quickly to raise the blood pressure.

8. *The strenuous life.* Excitement directly raises the blood pressure, and is probably one of the most common causes of high blood pressure, outside of dietetic habits and microbic toxins. Modern society exists in a state of more or less constant excitement. Every form of modern amusement is constructed with a view to thrilling, startling and exciting the spectator; and all this reacts upon the nervous system in disturbing the blood pressure. The inordinate craving to be hurled through space at increasingly perilous speeds is likewise both a cause and a result of the modern high pressure régimé.

HIGH AND LOW BLOOD PRESSURE

High Pressure States	*Low Pressure States*
Arteriosclerosis	Wasting diseases
Angina pectoris	Anemias
Valvular heart disease	Chlorosis
Myocarditis	Tuberculosis
Apoplexy	(Early, of the lung)
Paralysis	Thyroid disease
Bright's disease	Addison's disease
Alcohol	Diabetes
Tobacco	Prostatic disease
Tea and coffee	Typhoid fever
Lead poisoning	Eruptive fevers
Overeating	Pneumonia
Overseasoning	(after 2nd day)
Meat diet	Cholera
Constipation	Toxemias (some)
Autointoxication	Tobacco heart
Toxemias	Tobacco (excessive)
Migraine	Delirium tremens
Pregnancy	Alcohol (immediate)
Uremia	Poor circulation
Acute infections	Cardiac dilatation
Head infections	Cardiac asthma
Throat infections	Hemorrhage
Gall-bladder infections	Shock—collapse
Pelvic infections	Heart failure
Chronic infections	Constipation
Syphilis	(in certain cases)
Tabes dorsalis	Diarrhea
Exophthalmic goiter	Jaundice (sometimes)
Glaucoma	Phosphaturia
Emphysema	Neurasthenia

High Pressure States	*Low Pressure States*
Exposure	Hysteria (sometimes)
Overwork	Paresis
Chronic pain	(and, when the acidity is low, the following):
Loss of sleep	Epileptic coma
Strenuous living	Neuritis,
Worry—fear	Sciatica,
Nervousness	Lumbago,
Anxiety	Arthritis, and
Anger	Myalgia

THE TREATMENT OF BLOOD PRESSURE

Among the various agents which are employed in combating high blood pressure, the following may be mentioned: Graduated exercise; deep breathing; rest in bed; massage; hydrotherapy; electric light baths; reduction of food and liquids; reducing the meat and other proteins in the diet; restriction of salt; improvement of skin circulation; oxygen baths; sinusoidal electric baths; diathermy; saline purging; warm climate; mental attitude; recreation; cheerfulness; together with a diet which tends to increase the alkaline reserve of the blood; and, of course, any effort to reduce blood pressure implies that nothing is left undone to remove any active or exciting causes of high tension.

In our efforts to combat low blood pressure the following procedures are employed: Light exercise in the fresh air; abdominal binders and light massage; copious water drinking; improvement of the nerve tone by mental medicine, electrotherapy, hydrotherapy and Nauheim (CO_2) baths; and, as in the case of high pressure, all efforts at treatment should be accompanied by intelligent measures directed toward the removal of any known cause of low pressure.

Low blood pressure is primary when it is not due to heart weakness; it is spoken of as secondary when it follows a preëxistent high pressure and when it is thus indicative of threatened heart failure.

CHAPTER XXXI

PREVENTION OF OLD AGE DISEASES

The time has come when the American citizen should begin to pay some attention to the vital statistics of the nation; when he should wake up and begin to take a real interest in postponing his own funeral. Somewhere in the future there will come a time when the government will not allow people to die promiscuously and prematurely without inquiry—when the citizen will not be allowed to commit suicide on the installment plan. The time is certainly coming when, every time an American citizen dies under fifty years of age, a coroner's inquiry will be held to ascertain the cause of death and place the responsibility.

Practically all of the contagious or microbic diseases at the present time are on the decrease, and their death rates are gradually going down. Modern science is slowly gaining the victory over the microbe, but in the presence of this wonderful achievement, we stand face to face with defeat as regards the struggle with the degenerative or so-called old age diseases. There are three probable causes for the poor showing in this field: (1) These diseases are in part being produced by personal habits of living—conditions which cannot be controlled by sanitary laws and quarantine regulations. (2) Most of these degenerative diseases are largely symptomless. (3) By saving the lives of so many babies and younger persons, we enable a larger number of individuals to reach that age where they encounter the risks and dangers attendant on the diseases which are characteristic of the more advanced years of life.

VITAL STATISTICS

Vital statistics must be interpreted by experts. A great many factors enter into their correct understanding, and it is sometimes possible, apparently, to prove two contradictory propositions by the same statistical data. The questions of

race, nationality, season, sex and occupation; not to mention locality, all enter into the interpretation of these figures regarding health and disease. For instance, women are, in general, longer lived than men; while recently settled communities contain more young people in the prime of life, and therefore, would, necessarily, show a lower death rate. The large cities present their own peculiar problems which must be taken into consideration in the study of vital statistics.

The birth rates of most civilized countries, like the marriage rates, have been on a steady decline for a number of years. It seems that the civilized peoples are getting married at a later age, as the years go by, thus reducing the length of the period of reproduction; at least this is true of the superior classes, but we think the birth rate is more directly influenced by other causes, such as the more widespread practice of various methods of "birth control" and by the economic situation—the high cost of living.

A hundred years or more ago our forefathers frequently had families numbering a dozen children or even fifteen or more. Nowadays a family of six or eight is sufficiently large to attract general attention. The large families, to-day, in the United States, are to be found, most frequently, among the more recent immigrants. Now, if the death rate increases, or is not decreased, in the presence of this declining birth rate, we have a serious problem confronting us, from the standpoint of normal growth and the future of the race.

CITY AND RURAL DEATH RATES

Some interesting information can be gleaned from studying and comparing the city and rural death rates of the original registration states.

Annual death rate per 1000 living white males:

Age	Rural	Cities	Excess City over Rural
20-21	4.83	4.93	2%
25-26	5.13	5.73	11%
30-31	5.39	7.32	34%
35-36	6.30	9.73	54%
40-41	7.06	12.10	71%
45-46	8.67	15.18	75%
50-51	10.65	19.17	80%

We learn by this comparison that the mortality in the cities, especially at the middle ages of life, greatly exceeds that in

the rural districts. There is a warning in these figures which we should heed. It is not alone that we need to cultivate more land and raise more food, but we need to place more people on the land and so to govern and guard the health of our industrial classes in the cities, that the limited call on muscular activities and greater strain on the vital organs may be, to some extent, neutralized.

The population, taken as a whole, might not show such a balance in favor of the country. In some respects the city is a more healthy place than the country. Modern sanitation, and other measures which safeguard the health of the children in the larger cities, are, year by year, contributing to make the children of the cities more healthy and vigorous than the famed "healthy country boy."

PRINCIPAL CAUSES OF DEATH IN AMERICA

The last report of the Census Bureau on the principal causes of death in the United States, is highly instructive, and it represents our national system of bookkeeping as regards disease and mortality. The latest report we have at hand represents a general death rate of 14.2 per 1000 of population.

Of the total number of deaths occurring in the United States, almost one-third are due to three disorders—heart diseases, pneumonia and tuberculosis; while the next one-third of deaths are due to the following nine causes: Bright's disease or nephritis, apoplexy, cancer, diarrhea or enteritis, arterial diseases, influenza, diabetes, diphtheria and bronchitis.

During this one year there were 115,337 deaths (153.2 per hundred thousand) from organic diseases of the heart, including endocarditis, and this is a somewhat better showing than was made in some years previous. While statistics on heart disease fluctuate from year to year, there has been a general and steady increase, even a marked increase since 1900, the first year in which these annual mortality statistics were published, and which showed a rate of only 123.1 per hundred thousand as the mortality rate for heart disorders.

THE AVERAGE LENGTH OF LIFE

It is true that, during the last hundred years, the average length of life has increased from thirty-three years up to forty years, and can be variously figured out, by different methods and in different countries, as extending up to forty-

five or even fifty years and more, at the present time. Now, some of our enthusiastic sanitarians point with pride to this achievement, and attribute it to the improved sanitation of our great cities. They claim that the sewerage systems, pure water supply, better milk, etc., have all contributed to this decrease in mortality.

On the surface, it does seem that increase of the length of life has just about kept pace with improvement in sanitation and public health measures; but when we begin to analyze the statistics we discover that this apparent increase in the average length of life is almost wholly the result of lessening the death rate, on the one hand, from such contagious diseases as typhoid, smallpox, cholera, plague, etc.; while, on the other, it results from increasing the number of years which are lived by the population on the two extremes of life—that is increasing the length of life of infants and of the very aged, and other weak and enfeebled members of society. We do not allow the children of the poor, or the insane and feebleminded to die as soon as we used to. Science has intervened and reversed the law of the jungle.

Nature has decreed the survival of the fittest, but civilization has, these last few years, ordained also the survival of the unfit, both among the young and the old.

The true standard of vital endurance is not this apparent statistical average length of life, but rather the number of persons per 1,000 in the population who attain advanced age. As years go by, in any community, in any city, or in any state, there will be found a lessened number of centenarians, and so, while it is true that the average length of life has been increased, it is also equally true that the chance of any one individual living to a good old age has been markedly decreased. In other words, we have increased the average length of life by adding to the longevity of the infant, the weak and feeble, and certain groups of aged persons, rather than by adding to the length of life of the strong and robust—in fact, as will be subsequently shown, in some respects this desirable group in our population is not living quite as long as it used to.

What is the average length of life to-day? That is a difficult question to answer. There are several methods of figuring out an answer to this question. The average age at death, found by dividing the combined ages of all those dying in the registration area in a given year, by the number dying, would

give say 39.3 years. These figures are, however, of little value because they do not relate to a stationary population. Moreover, you cannot determine the average length of life by dividing 1,000 by the death rate, because the death rate refers to a constantly changing population due both to the excess of births ove. deaths and also to immigration.

The expectancy of life given in the life tables is the most reliable figure, because it is based on a stationary population and on mortality data for several years. These tables give the expectancy of life for men and women at 51.49 years.

MODERN HIGH TENSION

Perhaps the one prominent characteristic of our present-day social and commercial life is its high tension. In this twentieth century most people are living under high pressure and traveling through life at a fierce pace. The pressure gauge of modern life registers all the while dangerously near the bursting point, and the unfortunate thing about it all is that the very diseases that are engendered by this high-pressure living are largely *symptomless;* that is, they frequently present no serious symptoms and occasion no personal suffering until the patient actually stands on the brink of the grave. Very often the first knowledge one has of these defects is when they are turned down for life insurance; then they are rudely awakened to the fact that they have but a few months or years at most to live; that they are already an unconscious victim—in an advanced stage—of one or other of the so-called old age or degenerative diseases.

No automobilist would dare to drive his machine forward heedlessly and carelessly with no thought of periodic inspection and without proper oiling and care at regular intervals, unless his journey were one actually of life and death; and yet how often do we observe intelligent men and women urging their body machines forward heedlessly and carelessly under the lash of greed and ambition, utterly disregarding disease possibilities and utterly blind to the danger signals which are to loom up so soon in their pathway of life just ahead.

The higher the speed, the more intensely you drive the human machine, the more the necessity that the bodily mechanism should be regularly inspected. Many a man thinks nothing of spending from twenty-five to one hundred dollars, periodically, for having his automobile overhauled and kept in

first-class running order. At the same time, he is not willing to invest even half that amount in the all-important business of periodically inspecting or annually overhauling his own physical body—his nervous, digestive, circulatory, and eliminative mechanism.

HEALTH AUDITS

What is a health audit? It is a regular, systematic and searching medical examination of an apparently perfectly well and healthy man or woman. As a rule, people go to see a doctor only when they are sick or suffering. Years ago, people patronized the dentist when they had the toothache; now, you go to the dentist regularly—periodically—once every six months, at least once a year, to have your teeth cleaned and carefully scrutinized for small cavities or other difficulties. Nowadays some folks are learning that it pays to call on the doctor at least once a year, to have their vital machinery inspected and overhauled—and not wait for some painful manifestation to put in its appearance before calling in medical assistance. For years we have been preaching that "prevention is better than cure," and now the "health audit" is a serious attempt to put this good advice into practice.

In this country every year hundreds of thousands of dollars are spent to determine how bookkeepers, cashiers and other confidential agents are doing their work, while next to nothing is spent by these very painstaking individuals—captains of industry and merchant princes—to find out how their own personal vital organs—lungs, liver, kidneys, heart, and blood vessels—are doing their vital work. You can discharge an incompetent accountant, fire a dishonest bookkeeper and get reliable workers in their place when you discover their discrepancies, but it is not so with one's vital organs; when they go wrong it is often too late to secure very much help. We have but one set of vital machinery to run us a lifetime, and when, through neglect, it "goes stale," we have to make out with what we have left when we discover our mistake.

HOW THE HEALTH AUDIT IS PRACTICED

When a man or woman reaches the age of twenty-five or thirty years, they should submit themselves to a searching health audit and have this complete research repeated about every five years from that time on; while annually they should

have this examination checked up at points which may be indicated, together with such simple tests as blood examination, urinalysis, and blood pressure. In cases where blood pressure or urine is off color, it might be well to check them up every three or six months until they show improvement.

It should be remembered that Bright's disease, apoplexy, heart failure, nervous prostration, diabetes, and many other physical and nervous disorders which contribute so enormously to the modern death rate and which so appallingly cripple the efficiency of the civilized world, I say, it should be remembered that these disorders usually cast their warning shadows a long way ahead of the actual cataclysm. While these diseases are largely *symptomless* so far as the patient's ability to detect them goes; nevertheless, to the physician, they hang out red lanterns of warning which would never be overlooked by these systematic and periodic audits or health examinations.

But we see evidences of an awakening on the part of the American nation. People are really beginning to come to the physician now and ask for this annual inspection. After you are twenty years of age—have a medical examination every birthday.

WHAT THE ARMY DRAFT REVEALED

Astonishing facts are discovered in the examination of people supposed to be well. Between 1914 and 1917 the examining surgeons at the various United States Army recruiting offices rejected 77 per cent out of 205,281 applicants for the army. So it appears that just about three-fourths of all applicants were below physical standards, and as the reader will recall, after entering the war, these standards were greatly lowered; but even then one-quarter of all the men examined were rejected.

After going to the mobilization camps these men were all examined again, and 30,000 more were rejected. One-fourth of these were found afflicted with bad eyesight; 8.5 per cent had bad teeth; and still other troubles revealed by the second examination were hernia, ear troubles, heart disease, tuberculosis, mental deficiencies, venereal diseases, and a lot of other common but unsuspected disorders.

But this is the important question which the reader will need to ask himself or herself: If the men of this country between twenty-one and thirty-one years of age are in this

bad condition, the women must be in an equally deplorable condition, or probably worse; and if these select individuals, candidates for the army and the national defense, are thus afflicted, what must be the condition of the average American man and woman of to-day? It is self-evident that these army examination data call for the immediate institution of the annual examination habit on the part of the American people. I repeat: Go to your doctor once a year.

ECONOMIC VALUE OF POSTPONING DEATH

By many authorities and by numerous methods, efforts have been made to arrive at an estimate of the value—in dollars—of increased health and efficiency and to estimate the economic value of lives saved as a result of better sanitary surroundings and improved hygienic living conditions.

The economic value of a given life is arrived at by estimating the worth of a laborer's output at various times during his life by discounting his chances of future earnings and then subtracting the cost of his maintenance. In this way we make a rough estimate of the economic saving which may be effected by improving the health and increasing the length of life of the American wage earner.

It is generally assumed that about three-fourths of those of working age are actually wage earners or the equivalent—housekeepers. The money value of an individual thus reckoned starts out at about $150.00 for the first year and gradually rises to about $7,000.00 at the age of 30, after which there is a steady decline until it reaches zero at the higher and inactive ages. This estimate would about assume $1,200.00 a year to be the average earnings of middle life. Applying this conjecture to the present American population we find the estimated or average value of a person to be in the neighborhood of $5,000.00.

On this basis, the value of the average person who is now sacrificed by preventable disease is reckoned at about $3,000.00 —owing to the fact that the age of those who die is considerably greater than the age of the living. Applying this estimated life value of $5,000.00 to a supposed population of 100,000,000—we find the economic value of the people of this country to be $500,000,000,000. Now, since the number of preventable deaths has been estimated at almost a million a year (at least a half million by the most conservative) it

would appear that our annual preventive death waste runs anywhere from $1,500,000,000 up to $3,000,000,000.

There are from 3,000,000 to 5,000,000 persons sick all the time in the United States. About one-third of this number of disabled persons are in the working period of life and of this number of persons of working age fully 75 per cent are actual wage earners. This would indicate that there are at least 1,000,000 bona fide wage earners sick all the time. If we estimate the average economic value of these persons at the figure already noted—$1,200.00 a year—it would give us an aggregated annual economic loss from illness equal to $1,200,000,000.

We should add to this annual sickness money loss of over one billion dollars another billion of dollars for medicine, medical attention, nursing, etc., making the combined cost of our national illness considerably over two billion dollars a year. And it is a conservative estimate to suppose that at least one-half of this illness is preventable—making the net preventable sickness of the nation cost us a little over one billion dollars a year.

Now, if we add the preventable loss from death—say at $2,000,000,000—to this economic loss from preventable illness of at least $1,000,000,000 it gives us the grand total of $3,000,000,000 as the very lowest estimate of our annual economic loss from preventable diseases and premature—and preventable—deaths in the United States.

CHAPTER XXXII

THE PREVENTION OF CANCER

Can anything be done to prevent cancer? Certainly. Cancer must be largely considered as a preventable disease. As soon as the public mind becomes conscious of this fact and recognizes its duty, then the death rate from cancer will begin to decrease. When it comes to the prevention of cancer, there are several things that must be made clear to the layman. They are:

1. Cancer usually results from long-continued local irritation of the tissues. This irritation is in almost every case preventable.
2. Cancer develops most readily and grows most rapidly in well fed, overnourished people.
3. Cancer seems predisposed to develop in certain families.
4. Cancer is not contagious—it is not "catching."

CANCER FAMILIES

In general, of those persons who die around the average cancer age, about one in ten dies from cancer. If your family has a death rate higher than this, then it is just that evident you belong to a so-called cancer family. In some families, it is much higher than one in five. Says Miss Slye, who has patiently experimented with cancer in mice for years: "Cancer follows the laws of heredity with an inevitableness which makes it a character which can be manipulated." Again, "Cancer can be bred into or out of a strain at will."

Concerning the prevention of cancer, Miss Slye says:

> Cancer is not transmitted as such, but rather as a tendency to occur from a given provocation, probably in the form of over irritation. The elimination, as far as possible, of all forms of over-irritation to the tissues of an individual of high cancer ancestry should go far to get rid of the provocation of cancer, and the eugenic control of matings, so that cancer shall at least not be potential in both sides, ought to eventuate in a considerable decrease in the frequency of human cancer.

If you belong to a cancer family, have all your ragged teeth removed or smoothed off. Do not wear a dental plate if it irritates. If you have chronic sores anywhere on your body, get them healed up. If your work irritates any part of your body, change your occupation.

Cancer is not contagious. But ordinary care and cleanliness should be observed in the care of cancer patients and all dressing cloths burned immediately after removal.

IS CANCER CURABLE?

Despite the alarming increase in deaths from cancer, there is a message of hope sent out by the medical and surgical experts who have studied the disease in all its forms. This message is to the effect that cancer is largely a curable and preventable disease and that fully sixty per cent of the almost 100,000 yearly deaths in this country are needless and preventable.

Medical men know a great deal more about cancer to-day than was known twenty years ago. For example, it is known that cancer is at first a local disease and not a constitutional or blood disease. It begins in one spot as a small growth which in the early stages can be removed. And if this is done promptly by a competent surgeon, every trace of the disease can often be eradicated and a complete cure effected. But if neglected, cancer spreads rapidly and like a fire not taken in time, soon gets beyond control.

So it is evident that early diagnosis and treatment are the important things in the prevention of cancer and in the reduction of deaths from this cause. This means that in all cases of suspected cancer, medical advice should be sought at once. Delay is dangerous. A sore on any part of the body, malignant in character, and which refuses to heal in a normal manner, should not be neglected. Don't try advertised cancer cures. Consult your physician and be guided by his advice.

In most cases, taken in the early stages, the operation of removal is of a minor character and attended by no danger.

Thus, Dr. Bloodgood, the distinguished surgeon of Johns Hopkins, and one of the leading authorities on cancer in this country, offers the following encouraging statement:

> From what we know of the early signs of cancer and the local growth in the early stages of cancer, or what precedes cancer, we should draw the greatest encouragement as to the probability of the

percentage of cures possible in these early stages of good surgery. In the breast it should be at its worst 86 per cent, in local cancers of the skin over 98 per cent, in the lip and tongue over 90 per cent, in the bone over 75 per cent. With the accumulating experience of each succeeding year with such early cases, the percentage of cures increases.

DEATH RATE

Of the 100,000 people who die in this country every year from cancer, it is a certainty that at least 50,000 of these deaths could be prevented if we could enlighten laymen on the one hand, and further arouse the physician to his sense of duty in making an early diagnosis and recommending prompt operation, on the other hand.

It is a solemn fact we must stop to contemplate that in the United States cancer kills one woman in seven, and one man in eleven, over thirty-five years of age.

It is nothing more or less than suicide for the patient to assume the responsibility of waiting or for the family physician to advise waiting and watching in cases of suspected cancer. When cancer is concerned, when in doubt operate, and operate immediately, as surgery to-day offers the only hope of recovery. X-ray and radium are sometimes beneficial to use both before and after surgical operations, but nobody dares to claim that they can cure cancer. They have been thoroughly tried but they cannot be looked upon as curative agents.

Some cancers are much more easily cured than others. More than 90 per cent of cases of cancer of the lip are curable. Epithelioma appearing about the face is a form of cancer much less malignant and more easily cured by operation than is carcinoma in some other parts of the body, as, for instance, the neck of the womb. On the other hand, sarcoma is the most malignant of all and more fatal, even in spite of early operation.

It is interesting to know that the Mayos report 38 per cent of patients operated on for cancer of the stomach are well at the end of three years, and 25 per cent are well at the end of five years.

One explanation for the apparent increase in cancer in recent years is the fact that through lessening the infant mortality and prevention of various world plagues, a larger number of people grow to the cancer age, so that naturally, by increasing the average length of life, we are increasing the

number of deaths that appear as the result of the diseases peculiar to middle life and old age.

LOCAL IRRITATION AS A CAUSE

In India the beetle nut chewers are particularly predisposed to cancer; about half of the cancers admitted to the hospitals of India are found located in the mouth. Over-exposure to heat or X-rays is also a source of cancer. Blows or other injuries predispose to malignancy. Irritation of clothing, scratching or rubbing warts or moles, often turns them into malignant growths. Irritation of the lip as the result of smoking should also be mentioned.

Attention should also be called to the probable injury of the tongue, mouth, and lips from too hot or too cold food and drinks. Someone has even suggested that one of the reasons why men have more cancer of the tongue and mouth is that they sit down and begin eating the hot food earlier, while the wife is still serving from the kitchen and that by the time the wife eats the food has cooled off a little; but I am more of the opinion that the men have cancer in larger numbers because of the use of tobacco.

Local irritation of some sort nearly always goes before the appearance of cancer, especially in the case of those families predisposed to cancer—those families having a high cancer death rate.

HOW TO PREVENT CANCERS

1. *Cancer of the mouth, lip, and tongue.* Cancers about the mouth and on the tongue are largely preventable. Much of this form of malignancy could be prevented by having a dentist keep the teeth smooth and clean on the one hand, and by curtailing smoking, particularly the use of pipes, on the other hand. A whitish spot or patch which appears on the tongue or about the lips, or ulcers occurring on the lips or tongue, or any other abnormality that appears to resemble a warty growth, should receive immediate attention. They are precancerous manifestations. Any burn of the tongue or lips or injury secured in connection with dental work should not be neglected. If it persists a surgeon should be consulted.

It is wise in these cases of mouth disturbances to use a solution of soda in water as a mouth wash, one teaspoonful of soda in one-half glass of water.

Any sore, ulcer, white patch, or other condition about the tongue or mouth which does not heal or disappear within three weeks should be immediately operated upon by a competent surgeon who will know how extensive an operation should be performed, and in this way 90 per cent or more of cancer of the lip, mouth, or tongue could be avoided.

2. *Cancer of the skin.* The precancerous state in the skin often consists in tumors, moles, warts, birthmarks, scaly, thickened patches, etc. Now the common wart seldom turns into cancer, but moles and other birthmarks often do. Warts may be removed by many methods, cautery, acid, etc., but the layman should never tamper with moles. That is a job for the surgeon. If moles, warts, or birthmarks become irritated, inflamed, bleed, look angry, or have a tendency to grow and spread, they should be immediately removed, either with a knife or by electric cautery.

It matters very little whether the cause of the local skin condition be congenital, a birthmark; or whether it is caused by injury, tuberculosis, syphilis, or excessive sunburn; or whether it comes from lead or arsenic. The condition should always be looked upon as possibly precancerous, and since these conditions are easily removed, practically all cancer of the skin must be looked upon as being preventable.

X-ray and radium may cure skin cancer, that is, the cancer belonging to the epithelioma group. Indeed, arsenic paste, carbon dioxid snow, and other remedies may bring about a cure of this form of cancer; and it is this fact that gives reputation to many and varied cancer cures. Because some cancer faker can cure this form of cancer or other skin troubles which perhaps are not cancerous, then men and women with real cancers risk their lives on these remedies, and lose them practically every time they risk them.

Let us emphasize the fact that to-day there is no known cure for cancer; only early and radical surgical operation offers any hope, operation at a time when all of the growth can be removed.

3. *Cancer of the breast.* We do not know the predisposing causes for cancer of the breast, except that it has a tendency to come in those cases where there has been trouble in connection with childbirth, or where a blow or some other injury has been received upon the breast. We therefore have no

forewarning of this condition until a tumor of some sort appears.

Now, on the average, more than half of these tumors, if they are early removed, will be found to be benign, that is, not cancerous. Dr. Bloodgood claims that only 1 per cent of lumps in the breast are malignant in women under 25 years of age, but we believe it is a good practice to take out all lumps in the breast of every female over 20 years of age. In this way, we know we are going to prevent cancer. Why take a chance, since the prospects for recovery when cancer of the breast has once become fully developed are less encouraging; although if an operation is done early, dependent upon the kind of cancer and if the proper operation is done, it is now believed that somewhere from 75 to 90 per cent of these cases can be saved.

There is not much chance of recovery from a breast operation if we wait until the skin surface is ulcerated and there is pain extending down the axilla into the arm, with enlarged glands in the arm-pit. Most operations at this time will be failures owing to the fact that the cancer has already spread to the glands in the chest, to the liver, and elsewhere.

If the patient and the surgeon will coöperate, and if early counsel is sought on all tumors of the breast, more than three-fourths of the present deaths from cancer of the breast could be eliminated in a single generation.

In case of suspected tumor of the breast in even young unmarried women, an incision can be made beneath the breast; by dissecting upward the tumor can be removed, and it can be turned over to the pathologist, who in a few minutes after freezing with carbon dioxid gas will be able to report to the surgeon whether the tumor is benign or malignant. If benign the simple wound can be closed up. If malignant, the entire breast, by radical operation, can be removed.

Remember this: when cancer has spread to the neighboring glands, the chances for recovery are enormously lessened. For instance, in cancer of the breast, when it is operated on before it has spread to the lymph glands, 80 per cent are found alive and doing well five years after the operation, but when operations are done after the lymph glands are enlarged in the arm-pits, only 25 per cent of the patients operated on are found alive five years afterwards.

Almost one-half of the cases of cancer of the breast come to the surgeon too late for operation.

4. *Cancer of the thyroid.* Irregular lumps in the thyroid gland in persons over 20 or 25 years of age should be removed as soon as discovered. This does not mean that simple goiter, so commonly found in young people, which consists of uniform and symmetrical enlargement of the gland, should arouse fears of cancer. A physician will quite readily recognize the difference between an ordinary thyroid enlargement and a probable cancerous or precancerous growth. Cancer usually begins in the thyroid as a benign growth and if removed before other parts are involved, as a general rule the operation will be successful, and in this way fatal cancer of the thyroid can be prevented.

5. *Sarcoma of the soft tissues and bones.* Sarcoma is a rapidly spreading cancer and therefore any tumors appearing in the soft parts of the body should be immediately removed before they have a chance to spread and produce death within a short time. These tumors must be removed by radical operation.

In the case of pain at one point in a bone or joint which comes on after injury, X-rays should be made immediately, as also blood examination, and in these cases operation should be the first thing done and not the last thing. In general, people put off surgery until the last, trying everything else first. In case of suspected cancer, especially sarcoma, *use surgery first,* as it is only in the earlier stages that a cure can be expected.

6. *Cancer of the uterus.* Cancer of the uterus, or womb, is largely preventable. It more commonly begins in the mouth of the womb (cervix) in the case of women who have borne one or more children. Cancer of this organ is always indicated by any irregular, unnatural flowing or hemorrhage appearing between the regular periods, or appearing at the time of change of life, in an irregular manner after the periods have ceased.

It is for the purpose of preventing cancer that surgeons advise the repair of tears in the perineum, lacerations of the cervix, as well as sometimes the removal of degenerating and bleeding fibroids or other conditions of an inflammatory nature connected with the female generative organs. Cancer of the body of the uterus is not so highly malignant as that of the

neck or mouth of the organ. Early operation in the former is nearly always successful; and even in the case of the latter, it may be looked upon as successful in the majority of cases if performed early and thoroughly.

About 90 per cent of cancer of the uterus comes to the surgeon too late for successful operation.

7. *Cancer of the stomach.* It is probably true that many cases of cancer of the stomach develop on the site of a pre-existing ulcer. If that is true, then we must continue to look upon gastric cancer as being largely preventable, for we know that these ulcers can be either cured by proper diet, or if this fails, they can be removed by surgical operation, thus avoiding all danger of their turning into cancer subsequently.

Most cases of cancer of the stomach appear in those patients who have suffered half of a lifetime from indigestion, dyspepsia, stomach trouble, etc. Sometimes they get better and then after they are 45 or 50 years of age they suddenly begin to lose in weight, their old stomach trouble returns. Now, loss of weight before forty should lead us to suspect tuberculosis, but sudden loss of weight after forty should always make us think of cancer.

In those cases, don't wait for the cancer to grow and until the patient vomits up one day the food eaten two or three days before—dark coffee ground vomitus. Do not wait until there is a large mass to be felt in the stomach, as X-ray examinations and proper investigation will reveal the probable presence of cancer much earlier, in time to hope for success following an operation. It should be known that practically half the stomach can be removed these days and the patient do well.

If failure to prevent and cure these ulcers is the cause of cancer, let us not make a second blunder by resorting to operation too late for any hope of help.

In the case of cancer of the stomach there is not only loss of weight, but of strength and appetite. The patient is mentally depressed and has a sense of impending doom. There is a peculiar pallor about the nose, eyes, and mouth, and there is often a pinched expression of the face. In the earlier stages, pain in the stomach is absent, but there is continuous feeling of distress made worse by eating, and there is usually much gas and more or less heart-burn.

8. *Cancer of the colon.* Cancer at some point in the large intestine is the least preventable of all of the forms of malig-

nancy because it is usually not recognized in time to have a successful operation; but if it can be found in time, operations are successful in a large proportion of the cases.

Many cases of cancer of the lower bowel could be found in time to be operated upon if physicians made a more systematic practice of thoroughly examining the rectum. Many of these cases are allowed to progress to fatal termination or to a point too late for successful operation because of the fact that either the patient or the physician or both treated the condition as one of hemorrhoids, or common piles.

Do not neglect hemorrhoids. If salves and ointments and the cure of constipation do not cure the hemorrhoids, if they continue to make trouble and if the patient is over forty years of age—have them removed.

9. *Abdominal cancer.* We have cancer of the gall-bladder, the appendix, and of other abdominal organs, but as a rule the layman is unable to contribute to their early discovery as the symptoms are more or less obscure, and they are the least hopeful of all from the standpoint of early recognition and successful operation.

IMMUNITY TO CANCER

There is some reason to believe that certain persons or families, even, are immune to cancer. In experiments, mice are sometimes found to recover from inoculated cancer and you cannot give them cancer again. Even their blood is of some slight curative value when it is injected into other animals suffering from cancer.

There are cases on record in which human beings have recovered spontaneously from cancer, though, of course, they are very rare. But this is one of the reasons for operating early in cancer before the patient's immunity is entirely broken down or destroyed.

Miss Slye has shown that cancer has a tendency to run in certain families of mice. The study of cancer in mice suggests that human beings who have cancer on both sides of the house should not be allowed to marry.

Some students of this question doubt that cancer even has a tendency to run in families, so that this is a question not altogether settled at the present time.

CHAPTER XXXIII

HYGIENE OF THE SKIN

The skin is not only the seat of common sensation, but, by means of the vapor which it constantly gives off in the form of perspiration, it becomes the great heat regulator of the body. To serve these purposes, it is well supplied with nerves, blood vessels, and numerous glands. It has two layers: the outer cuticle or epidermis, and the inner dermis or true skin, of which the hairs and nails are excessively developed parts.

The *skin is a show window* in which the body displays its general internal condition. Some diseases have more of a tendency to show themselves on the skin than others. For instance, a bronzing of the skin means trouble in the adrenal glands. Sunburned appearance of the skin which has not been exposed to solar rays means that somewhere in the human machinery pellagra is beginning to work. A pale white skin means anemia, or else it signifies some disturbance of the circulation. Pimples and boils mean that the germs which are ordinarily found on the skin have begun some sort of mischievous action. Sometimes the responsibility for these infections lies in the skin itself, but many times it is also probably due to some disturbance in the chemistry of the blood.

Many of the acute infectious diseases have characteristic skin symptoms by which they may be diagnosed. Even the red nose, sometimes referred to as a "rum blossom," may appear as the result of prolonged digestive troubles. Users of alcohol have it because alcohol always produces bad digestion.

Some diseases may enter the body through the skin. For example, hookworm. While others infest the skin, as in the case of the various forms of itch, ringworm, etc.

THE SKIN STRUCTURES

The skin is provided with two distinct sets of glands: sebaceous and sweat. The sebaceous glands are generally situated near the roots of hairs and secrete a peculiar, fatty

substance which very effectively prevents the skin from drying up and cracking. These glands are distributed more or less over the entire surface of the body, but are most numerous in those parts which are largely supplied with hair.

When the openings of these sebaceous glands become closed the glands continue to secrete and a small swelling appears; this retention of the secretion sets up an inflammation, which continues until the contents of the inflamed sac are removed. This is the cause of little pimples or boils.

The *sweat glands* are microscopic tubes reaching down from the surface of the skin to the loose connective tissues just beneath it—the subcutaneous tissue. They are found all over the skin, but are most abundant in the palms of the hands, the soles of the feet, and on the brow.

The watery vapor which passes off through the pores of the skin is called insensible perspiration, when the quantity is not sufficient to be noticed; sensible perspiration or sweat, when it is so profuse as to collect in small drops on the surface. It consists chiefly of water, with a small proportion of muriate of soda and free acetic acid. The quantity is at all times very considerable, but it is greatly increased by violent exercise and during hot weather.

From two to three pounds of water daily reach the surface of the body. It is supposed that at least one hundred grains of nitrogenous matter are in this way daily thrown off from the skin. If this secretion of sweat is checked or arrested, it immediately throws additional labor on the kidneys; if it remains in the blood, it will prove fatal to good health and happiness.

The skin not only covers the body without, but also within. The cavities of the nose, the mouth, and all the internal passages, are covered with skin, though it is of finer texture, and is called *mucous membrane*.

The lips are red, because they are frequently moistened by the saliva. Sometimes disease (cancer) makes it necessary to remove a lip and then a new one is formed by the surgeon from the outer skin. In a short time it becomes red, almost like a natural lip.

The degree of *sensation* varies in different individuals; for this reason, heat and cold are only relative terms. What is hot to one person may be merely warm to another. The sense capacities of the skin are, after all, largely a matter of educa-

tion and training. They are also greatly influenced by disease. Tickling is a peculiar sensation, and is often independent of other sensations residing in the skin. Pain is another characteristic sensation of the skin.

In *fever,* we have an overproduction of heat in connection with non-sweating skin. The sweat glands are inactive because of the influence of poisons on the nervous system, while the body is producing an enormous amount of heat in an effort to burn up the disease-poisons which are being formed within the system. The patient's temperature goes up because of the increased heat production accompanied by decreased elimination.

SIGNIFICANCE OF PALE SKIN

The blood vessels of the skin can hold more than half of all the blood in the body; therefore, in all cases of pale skin, cold hands and feet, etc., the blood which properly belongs to the skin must be found in some of the internal organs which are more or less over-distended and congested. From this it follows that the pale anemic skin usually means congestion of some internal organ from an over supply of blood—producing inflammations, etc. The weakest organ, of course, will suffer most, and this will determine whether the individual has headache, stomach trouble, constipation, or more likely portal (liver) congestion, resulting in biliousness, the blues, etc.

The various nerves ending in the skin make it possible, by the application of heat and cold, rubbing, etc., very wonderfully to influence the circulation of the blood in the internal organs. This is possible because of the fact that certain parts of the skin are supplied by nerves coming from the same centers that also send nerves to certain internal organs. Thus the skin comes to be a sort of keyboard, by which the physician may operate and control the internal mechanism of the body, to regulate the circulation of the blood, etc. This is the basis for the modern scientific use of water and other forms of heat and cold in the treatment of disease.

FRECKLES AND SUNBURN

Freckles are merely small spots of increased pigmentation which have a tendency to appear on persons with sensitive skins after exposure to the sun and wind, though the freckles

are not produced by the sun as is ordinary tan; it merely accentuates the condition. They may be prevented by the wearing of broad-brimmed hats. Many lotions and ointments have been recommended for this condition, and if used carefully and frequently they may tend to check the process and sometimes even to remove the freckles. A remedy frequently used for this purpose is to dissolve three grains of perchloride of mercury in an ounce of glycerin, and apply three times a day, or until the skin becomes slightly red, whereupon the treatment should be discontinued and a little zinc ointment, or a little cold cream, should be applied.

Tanning is the result of exposure of the skin in the open air to the sunlight and it results from a succession of sunburns, all of which is enhanced if a brisk wind is blowing during the time of exposure. Sunshine has a tendency to penetrate and thus to influence the deeper tissues, and Nature brings about this sunburn or tanning in order to deposit pigmentation in the skin and thus to protect the internal organs. Sunshine is a good thing for human beings, but too much of it is deleterious, and tanning of the skin represents Nature's effort to regulate this matter in a manner beneficial to the individual.

There is nothing to be gained by undue exposure of the skin to the sun. That is, there is nothing beneficial in sunburn in too large doses. It is exercise in the open air that does good. There is little to be gained by lying around about the beach in an indolent fashion and getting sunburned, which represents no effort except exposure to the sun while lounging on the sands of the seashore.

The winds of a dry climate tend to make the skin brown and leathery through undue evaporation of its moisture. There is altogether too much of a fad about getting tanned. Over-sunburning is not desirable. If one is to secure a good coat of tan it is better to secure it gradually, on the installment plan. There is nothing to be gained by going bareheaded in the glaring sunlight of mid-summer. More harm will be done than good. Exposure of the bare head to the sunlight of mid-summer is more likely to cause baldness than to cure it.

THE HAIR

In addition to the many layers of the skin, and the beautiful way in which nature has put them together, there are other

interesting structures closely associated with it, which will now be considered. The hair, the eyebrows, the eyelashes, and the finger nails are all parts of the skin, and develop from it.

The hairs are long, cylindrical threads, or filaments, placed in a slanting position in the skin, in what are known as hair-follicles. The *hair* covers all portions of the body except the palms of the hands, the soles of the feet, and the back part of the last joint of the fingers and toes. There are several varieties of hairs on the body—the long, soft hair of the head; the fine, downy hairs that cover the face and nearly all portions of the body; and the short, stiff, pointed hairs found in the eyebrows and eyelashes.

Probably many often wonder how it is that a dog or a cat can cause the hair to stand up on its back at will or when frightened, and what causes the *"goose-flesh"* to form when we become chilled. Alongside the hair there is a little band of fibers—a small muscle connecting the hair shaft with the true skin. The hairs rest in a slanting position—the hair and muscle both slanting in the same way. Now, when a dog or a cat becomes frightened, all these little muscles contract, pulling on the roots of the hairs so as to cause them to "stand on end." When these little muscles contract in the human skin, the contraction serves to bring together a number of the little papillae in the true skin, and these form little cones on the surface, which we call "goose-flesh."

Most hair dyes are more or less poisonous. So-called vegetable hair dyes, hair invigorators, tonics, etc., often contain mineral poisons. Many of them contain lead. Many cases of chronic headache have been produced by the use of these poisonous mixtures.

Superfluous hair is particularly objectionable to women, except perhaps in Spain, where a slight mustache is regarded as an ornament. This growth of hair on the face of women is particularly conspicuous in the case of brunettes, and sometimes the matter is helped by bleaching the hair. For this purpose many bleaching substances are used, and probably the best is a saturated solution of peroxide of hydrogen. Depilatory pastes are used, particularly in the Orient, and they are of temporary service. The only sure method of removing the hairs is by the electric needle and even that is not always successful.

HYGIENE OF THE HAIR

The hair is designed as a protection against heat, cold, and injury. The luxuriance of growth varies greatly in different persons and is largely influenced by heredity, temperament and constitution. From the hair bulb—deep down in the true skin—the growth of the hair proceeds at the rate of from five to seven inches a year. When a hair is pulled out, this "bulb" is seldom injured, and so immediately produces a new hair. If the "bulb" is in any way injured or destroyed, the hair can never grow again.

Baldness is due to the death of the hair follicle, and the peculiar shiny appearance of the scalp is a sign that this stage has been reached. No effort will then produce a new growth of hair. When baldness begins there is necessity of arresting the process and of taking good care of the hair that is left.

A GOOD HAIR TONIC

Resorcin	1 dram
Quinin (alkaloid)	15 grains
Castor oil	20 drops
Alcohol	4 ounces

Mix thoroughly, rub into the scalp night and morning.

The itching of the scalp, which usually accompanies the excessive formation of dandruff, is extremely annoying and uncomfortable. There is a strong probability that it is occasioned by a parasite. If this be the cause, it will quickly respond to a few washings with bichloride of mercury soap, or, as it is often called, sublimate soap. This is a good agent for killing parasites and also for relieving itching of the skin in other parts of the body.

Dandruff is the commonest cause of baldness. Dandruff is a germ disease in itself (Seborrhea) which is probably contagious. After a period of two to seven years of dandruff and dryness of the hair occurring between the twentieth and thirtieth years, baldness begins. Not everyone with dandruff becomes bald, but baldness is the probable result, especially in men. In dandruff the germ ultimately destroys the roots of the hairs, which then fall out. Prevention is better than attempts at cure.

To cure baldness it is first essential to prevent or cure

dandruff, and the baldness will then be cured or will fail to progress. A hair wash should be used with which to thoroughly shampoo the scalp night and morning until the dandruff disappears. If the dandruff returns, the wash should be again applied.

A GOOD HAIR WASH

Mercury bichloride	10 grains
Glycerin	1 dram
Alcohol	8 ounces

Mix, use as scalp wash.

This is poisonous if swallowed. If the skin of the scalp becomes too dry, a little sulpher ointment may be rubbed in night and morning in place of the wash. The scalp may occasionally be washed with tincture of green soap. Most hair tonics and pomades are of no value, being founded on the older idea that the scalp needs stimulating in baldness.

Constant wetting of the hair is undesirable. Frequent cutting stimulates the growth of the hair, but does not increase the number of hairs. Barbers are prone to advise singeing to make the hair grow thicker, but it has no action of this kind.

There is undoubtedly danger of contracting serious infections from the *barber shop.* Syphilis may be communicated from a razor not thoroughly sterilized. Several germ and parasitic skin diseases may be conveyed from patients by barbers to other customers through the medium of the razor, scissors, brush and comb, and moist towels. These include the germ disease dandruff from brush and comb, ringworm, also barber's itch, an eruption on the bearded chin and upper lip of inflamed pimples containing matter or pus.

CARE OF THE NAILS

Like the hair, the nails are regarded as modifications of the skin. Their uses are to protect the tips of the fingers, where the sense of touch is extremely delicate, and the toes; also to enable us to pick up small objects easily. The nail is inserted in a groove of the skin, known as the matrix, and is attached to the flesh by what is popularly known as the "quick." The growth of the nail has been measured by making a mark at the base of the nail and then observing the length of time elaps-

ing before the mark has moved or grown up to the free end in five months; the great toe nail in ten months.

Hygiene of the nails requires the tips or free ends of the nails to be kept scrupulously clean. The accumulation of dirt under the nails, besides being uncleanly, is often of an infectious nature; it is the direct cause of serious consequences when children pick a sore. This accumulation of material under the nails is a common means of communicating infections. It is most conveniently removed just after washing the hands, and by using the nailbrush over the extremities of the fingers.

The nail is nearly surrounded, except at the free extremity, by a protective sheath, which should not be allowed to adhere to the nail as it grows with, or is drawn along by, the growing nail. After a time it breaks or splits, forming the painful "hangnail." This can be prevented by pushing the sheath back from the nail gently while the hands are still moist from washing. A sharp edge should never be used for this purpose, the towel or your thumb nail is much better. If these sheaths become ragged from neglect of this simple means, they may be snipped off with scissors to prevent more serious tearing. It is, perhaps, unnecessary to say that good breeding and a proper regard for the comfort of others requires that all of this attention to the nails is to be performed in private with the rest of one's toilet.

Our nails are undeveloped from lack of use and we are developing corns or pseudo-nails in new places as the result of new forms of pressure.

Ingrowing toe nail. This condition is usually brought about by lateral pressure of an ill-fitting shoe on the great toe and by wrong habits of trimming the toe-nails. To bring about a cure, correct the foot-wear, and cut the nails square with scissors instead of paring them. In severe cases it is better to cut the nail so that it presents a concavity instead of by the customary method that causes the nail, after it is trimmed, to represent a convexity. When the ingrowing toe nail becomes infected and is very inflamed it is sometimes best treated by the application of powdered alum. Apply the alum each day in the space between the nail and its bed and keep in place by a pledget of cotton.

In neglected cases that are infected, a surgeon should be consulted. Some cases of ingrowing toe nail require an opera-

tion for removal of a portion of its root. This, of course, brings about a radical cure of the trouble.

CARE OF THE SKIN

Two important precautions should be observed in the care of the skin; it should be kept clean and free from all impurities; and nature should be assisted by adequate clothing, in regulating the temperature of the body.

As we have learned in our study of the skin, several pounds of waste material are separated from the blood, and deposited upon the surface of the skin, every day. The upper layer of the skin soon loses its usefulness, and so dries and forms bran-like scales, which can be seen on any part of the body. Some of these are brushed off by the clothing, and some remain. The millions of pores and sebaceous glands are continually pouring their waste products out upon the surface of the skin. This makes bathing a necessity; and its performance is always mingled with no small degree of comfort and pleasure. It is for the removal of these dead scales of the skin that animals go in quest of the "rubbing-post." This is the purpose of daily grooming the horse. It is certainly true that some men take better care of their horses' skins than they do of their own. The skin must also be frequently washed for the purpose of keeping the surface clean and removing the poisonous excretions which are emptied out upon its surface by the myriads of sweat-glands.

Doubtless not a few of those very refined and fastidious people who spend many hours in the application of all sorts of lotions and other compounds to the face and hands, for the puropse of beautifying those portions of the skin exposed to view—while neglecting as persistently those parts of the skin protected from observation—would be very much surprised to learn the true condition of the unwashed portions of their cutaneous covering.

They instinctively shrink with disgust from the sight of a vermin-covered beggar, in whose cuticle burrows the itch mite, while troops of larger insects are racing through his tangled locks and nibbling at his scaly scalp. It is quite possible that many a fair "unwashed" would faint with fright if apprised of the fact that her own precious covering is the home of whole herds of horrid looking parasites which so nearly resemble the itch mite as to be at least a very near relative, per-

haps a half-brother or cousin. The name of this inhabitant of skins unwashed is as formidable as the aspect of the creature, though it does not require a microscope to display its proportions, as does the latter; scientists call it demodex folliculorum.

CHAPTER XXXIV

BATHING IN THE PREVENTION OF DISEASE

Water is the most abundant and widely distributed of all chemical compounds. It may safely be said that no other element in nature, except pure air, sustains such an important relation to health. Though water undergoes no change in the body, and hence takes no part in the generation of energy, it is absolutely essential to the performance of all the vital functions.

In both health and disease, water is the most largely used of Nature's agents, owing largely to the fact that it abounds in almost every part of the world, and that it is quite readily obtainable in its three different states—solid ice, liquid water and gaseous steam.

THE PHYSICS OF WATER

Water possesses great power of absorbing and transmitting heat, holding five times as much heat as glass, and ten times as much as iron. The heat absorbed by boiling water is called "latent heat," and is again liberated when the steam is condensed. *Latent heat* is also given up when the liquid water is frozen into solid ice. It requires almost two hundred and fifty calories of heat to evaporate—turn into steam—one pound of water; almost three hundred calories to evaporate one pound of ice water. Thirty-five calories can be removed from the body by the melting of a pound of ice in contact with the skin.

The ability of the atmosphere to absorb moisture depends largely upon its temperature. A cubic foot of air at 32° F. holds but two grains of water, while at 72° it holds eight grains, and at 96° sixteen grains. Therefore, a room 20x13x10 feet, containing dry warm air at 96°, would be able to absorb about five pounds of water. Too much moisture in the air somewhat hinders respiration.

The formation of *dew* is a simple process of natural dis-

tillation. The dew point is the temperature at which the saturated atmosphere begins to condense, or precipitate its watery vapors. This is beautifully illustrated when a pitcher is filled with ice water on a hot summer's day. The layer of air in immediate contact with the pitcher is so quickly cooled that its vapor is suddenly precipitated as dew on the outside of the pitcher. If the object on which the dew falls has a temperature below the freezing point, the dew freezes, and this is called *hoar frost.*

HYGIENIC BATHING

While this matter of personal cleanliness is no doubt one which is improving from year to year, there is still a vast portion of the population who remain utterly indifferent to the disease-dangers which follow the neglect of regular bathing.

We are aware that some have arisen among our own profession, to declare that bathing is unnatural and unnecessary; and we willingly admit that the savage, whose skin is constantly exposed to fresh air and sunshine, *has little need* of frequent bathing. Nevertheless, the bath is a hygienic necessity to the civilized races of this day, whose skins not only accumulate microbes and filth upon their surface as a result of our habits of dress, but are also debilitated, inactive, and sluggish, as a result of our indoor and other unnatural modes of living; all of which undesirable conditions are greatly helped, prevented, or relieved by frequent warm, cleansing soap baths, followed by short applications of cold water.

The neglect of regular bathing results in weakening the function of the skin as an eliminating organ, and this throws extra work upon both the kidneys and the liver. Neglect of bathing produces a debilitated condition of the skin, which so weakens the body as to render its owner a constant victim of colds, etc.

In short, regular bathing is an antidote for the wearing of clothes. It serves in a measure to undo the mischief wrought by indoor living and physical inaction. Hot and cold water, together with vigorous rubbing of the skin, produce a nervous and circulatory reaction that would be natural and spontaneous if our skins were properly exposed to fresh air and sunlight, and if the sweat-glands were daily exercised by profuse perspiration.

To bathe is a natural instinct, enjoyed and indulged in by many of the lower animals. Why should not man, who stands at the head of the earthly creation, value the bath, and employ it more frequently than do dumb animals? Yet some bathe but once or twice a year, and some only take a bath by accident—by falling into a pond, or something of the sort.

The bath seems to be greatly enjoyed by both animals and plants. The gentle shower of spring is Nature's method of administering a bath to all living things. How refreshing to watch the birds splash about in the water.

The bath is still more refreshing and exhilarating to man. "Cleanliness is next to godliness." If the skin is not kept clean, and if the clothes are not frequently changed and cleansed from their impurities, the pores of the skin become less and less active; then these poisonous materials are reabsorbed, taken back into the blood, and extra burdens are thus imposed upon the liver and kidneys. Bathing frees the skin from all these accumulated impurities, and keeps it soft and supple.

MORNING BATHING

Morning bathing is an exceedingly valuable hygienic practice. If properly taken, the cold bath harms no one and will do positive good to the majority of people in good or average health. The cold morning bath may be taken in the form of a wet hand rub, wet towel rub, cold sponge, or the full bath plunge. It is well for beginners to make use of the sponge bath, or the wet hand rub, and take the more vigorous baths later, if agreeable.

Persons of nervous temperament—those who are emaciated or underweight—will find it best, especially in the winter, to take their cold morning bath in a warm room and, as a rule, to precede it by a short application of hot water. Such persons are benefited by the reaction they obtain from the cold morning bath, but they cannot afford to lose the heat and nervous energy which are required to react from the cold water. Such thin-blooded and emaciated individuals do far better to borrow the necessary heat to react from the cold morning bath, from a short warm bath taken immediately before the cold bath. In carrying out this plan, one could take a hot shower for a few moments, followed by the cold shower, or rub the body thoroughly with hot water, followed by cold rubbing, or cleanse

the body with warm water, and then standing up in the bath tub, have several pailfuls of cold water quickly poured over them.

A POWERFUL NATURAL TONIC

The cold bath taken morning by morning serves as a tonic to the whole system. It is a course of gymnastics for the skin. If practised continuously, it will greatly improve the health and activity of the skin, and by keeping the blood circulating properly through the skin, it will be of great service to the healthy action of every internal organ. It is one of the best preventives of colds with which we are acquainted. By frequent cold bathing the skin becomes accustomed to low temperatures, so that drafts are unable to disturb the circulation of the blood. The morning cold bath should always be followed by prolonged and vigorous rubbing of the skin with a coarse Turkish towel.

When one washes the face with cold water on arising in the morning, it will be recalled how refreshed he feels immediately after. This refreshment results from the application of water to but a few square inches of skin surface on the face, as its skin is reflexly related, through the nervous system, to the brain. The cold bathing of the face produces sensations just as if the brain itself had been bathed, and this accounts for the marked awakening influence. Various other organs of the body are just as grateful for the refreshment which the application of cold water to the skin brings them, even if they do not possess the nervous means of expressing their gratitude as in the case of the brain.

THE CLEANSING BATH

Regular cold morning bathing will not suffice to keep the skin clean and healthy from week to week. Not less than twice a week (some individuals require at least three baths a week) a hot soapsuds bath should be taken. It is best to take this bath just before retiring, as it should be hot enough and long enough to induce free perspiration. One should stand up in this hot bath and moisten the hair and face—at least the face—in cold water before immersing the body. This is to protect the blood-vessels of the brain and prevent headaches or possible rupture of small vessels in the brain from the sudden rush of blood to the head.

It is well to lie in the bath from five to ten minutes, until sweating is well established, and then the body can be thoroughly lathered with soap, vigorously rubbed with a coarse shampoo brush, flesh sponge, or rough Turkish washcloth, after which the body is again immersed in the hot water for from three to five minutes.

Arising from the hot immersion bath, the skin should be immediately cooled and toned up by the quick application of cold water, accompanied by vigorous rubbing. This can be done by means of the cold shower, the pouring of a bucket of water over the shoulders, or by cold hand rubbing. After this the skin should be carefully dried and fanned with a sheet or towel until the body feels comfortable—neither overheated nor chilly. Then go at once to bed, and see that the covering is so adjusted for a few moments that the skin does not break out in perspiration.

Individuals in good health, who are not troubled with frequent colds, will find this bath taken two or three times a week to represent all the bathing necessary to keep the skin clean and active. If the skin circulation is good, hands and feet always warm, and the skin otherwise healthy, the health does not demand that one should take cold morning baths. However, the regular cold morning bath will certainly do even such healthy individuals no harm. With such it is merely a matter of choice and convenience whether or not they take morning baths.

THE NEUTRAL BATH

The neutral bath is given at a temperature of 95° to 97° F. It should not be above or below these temperatures. This is the great sleep-producing bath. While this book is devoted chiefly to the discussion of the preservation of health and the prevention of disease, it may not be out of place to mention briefly some of the common baths which may be used in the household for the relief of sleeplessness, pain, etc.

When tired, exhausted, nervous, fidgety, or unable to sleep, one should avoid both hot and cold baths. As a rule, they will only make matters worse, whereas the neutral bath, when taken with a thermometer in the tub so as to maintain a temperature of about 95° or 96° F. through the bath, will invariably result in quieting the nerves, resting the body and favoring sleep.

In by far the majority of cases, the resort to drugs and sleeping powders to obtain rest would be rendered unnecessary by the use of the neutral bath. It sometimes requires two or three nights for the bath to give the best results. Light massage or gentle rubbing of the body has something of the same effect as the neutral bath, and will sometimes put a patient to sleep as effectively as a dose of medicine.

Following the neutral bath, the patient should be dried off with as little excitement as possible, and put directly to bed. Chilling should especially be avoided.

OUTDOOR BATHING

Summer bathing is an excellent health practice if not overdone. The swimming-tanks now so common in connection with gymnasiums are a great blessing to the people. The public baths of our great cities are a godsend to the poor.

While sea bathing is a most healthful and hygienic practice, it is much overdone, especially by frail, delicate individuals. Sea water is a good skin tonic, and on account of its low temperature, as well as its salt, it is very beneficial to the skin and general health, if one does not stay too long a time in the water. Too long bathing in the sea overtaxes the reactionary powers of the nervous system and results in the loss of too much heat on the part of the body. As a result, the individual is debilitated, and this experience is followed by headache, lassitude, and depression.

A sudden plunge into cold water upon a very hot day is attended with grave danger. On the part of the young and robust, it is attended with the dangers of cramp and consequent drowning. With middle-aged and elderly persons, there is great danger of sunstroke and apoplexy, especially the latter.

Swimming. Swimming is a general bath combined with vigorous exercise, as nearly all baths should be. It is one of the most healthful kinds of exercise, if not continued too long, as it frequently is. The temperature of the water is commonly between 70° and 80° F., which makes it a temperate bath. Its effects are not far different from other forms of bath of the same temperature. We have not space to devote to a description of the art, since there are valuable treatises on the subject.

Diving removes mucus and chills the membrane of the nose,

lowering its resistance to germs. Divers are warned to stuff both ears and nostrils with cotton to avoid dangerous sinus infections together with ear and mastoid troubles.

A word as to swimming tanks—eye, ear, throat, and sexual infections are sometimes contracted from water in common use by bathers, even when care is taken to require a preliminary shower, etc. Intestinal germs are not infrequently found in the water. Disinfection with chlorid of lime, copperas, or other agent, together with frequent changes of water, are imperative.

TONIC BATHING

Outside of the ordinary cleansing baths, the majority of people need to take baths in order to tone up the skin and nervous system. Tonic bathing is effected by the use of both hot and cold water. The alternate application of hot and cold is the most powerful known tonic to the skin circulation and nervous system. The hot water should be taken first—followed by the cold. For instance: supposing that one has an ordinary overhead shower bath. The water should be turned on as hot as can be borne for about one minute (the time can be longer or shorter, adapted to the comfort and pleasure of the patient). The hot water should be instantly turned off and cold water—as cold as obtainable—should be immediately turned upon the body. The cold water should be taken from five to twenty seconds (this time can also be made a little longer or shorter, suited to the comfort of the patient). The cold water should be instantly shut off and the hot water turned on again for about one minute; then the cold water, etc., etc. Always begin with hot and end with cold. This constitutes the ideal tonic course of treatment.

Thousands of people who are lingering to-day in semi-invalidism could cure themselves by taking some such daily course of tonic treatment, followed by vigorous rubbing of the skin and a short walk in the open air—of course, in the meantime, giving due attention to other matters of hygiene as regards diet, sleep, etc.

Tonic baths are best taken in the morning directly on rising or during the forenoon. As a rule, it is best to avoid taking such treatment at night, when the nervous system is tired and the body worn out.

These tonic baths are good for the majority of individuals

who are not seriously sick, but who are not in the best of health. Tired feelings upon waking up in the morning, dyspepsia, constipation, biliousness, obesity, pale skin, cold hands and feet, headaches, catarrh, frequent colds, sluggish circulation, nervousness, etc., are greatly relieved and oftentimes entirely cured by this variety of treatment.

The salt rub. Use the ordinary coarse salt such as is fed to cattle. Place a pound or more of salt in a basin and just moisten with water. Have the patient stand or sit on a stool in a bathtub with the feet in warm water. Wet the skin, and then with both hands rub him all over with salt, beginning on the chest and back. The first treatment should be given gently. Wash the salt off with a spray, or by pouring water at 90° to 100° F. all over him, and then dry with a sheet. This is a most efficient tonic measure.

THE HOT BATH

The very hot bath, or sweat bath—whether taken by means of the vapor cabinet, electric light cabinet, Russian or Turkish baths, the hot full bath, or even the hot shower or spray—results in increasing the activity of the skin, promoting elimination, and greatly increasing the circulation of the blood. It is good for all conditions of pain or extreme fatigue. The very hot bath following a long walk is the best means of preventing muscle-soreness the next day. All conditions of rheumatism, gout, etc., are greatly helped by frequent hot bathing or sweating. When one is coming down with a cold, the prolonged hot bath in connection with the drinking of hot lemonade, together with a cathartic and thorough cleansing of the bowels by enema, will often prove successful in breaking it up. The uses of the hot bath in disease are so many that it is impossible to describe them properly in a work of this size.

Blanket packs. In this treatment three or four blankets are required, or one blanket and one or two comforters will do. It may be given on a bed or couch. As the object of the dry pack is to induce perspiration, or to get the patient warmed up, it is best to precede it with a hot tub bath or hot foot bath if possible, also hot water drinking.

Spread three blankets or two comforters upon the bed and a blanket over these, all covering the lower edge of the pillow. Have the disrobed patient quickly lie down, wrap the blankets

rapidly around him, tucking the edges up carefully, especially about the neck and shoulders, and have them comfortably tight. Only the patient's head is out. When a very rapid action is required, hot-water bags, bottles, or hot bricks should be placed about the patient, but guard against burning. Be sure to see that the feet are warm and well wrapped up. Have the patient drink water freely, either hot or cold.

The dry blanket pack should continue from one-half hour to two or three hours. It should continue two or three hours when trying to break up a cold. A short treatment does very little good.

This treatment may be used preceding a chill in malaria, or in the beginning of a fever, especially if there are chilly sensations. It should not be long continued when there is a high fever.

The blanket pack should always be followed by some vigorous cold treatment, such as a cold friction or a cold towel rub.

THE HOT-WATER BAG

Hot-water bags, being of rubber, retain the heat a long time, and may be used in place of fomentations, by surrounding the bag with a moist piece of flannel. As a rule, moist heat is more effective than dry heat. For backache, toothache, menstrual pains, or pain in the abdomen, the hot-water bag is indispensable.

Most people in filling a hot-water bag put in too much water. Fill the bag about one-third full of boiling water, then press the sides together above the water by holding it against a table, chair, or any object. This will exclude the air and steam. Then screw on the top, so that it will not leak. When placing to the feet, wrap in a flannel cloth. If a patient is unconscious, great care must be exercised to prevent burning. The water should not be over 120° F.

The ice-bag. The short, broad bag is the most serviceable or the rubber ice-cap is very convenient. Place a piece of ice in a towel and pound fine with a hammer or stick, and then fill the bag and tie tightly. Wrap in a piece of cheesecloth or a towel. The ice-bag should not be applied too continuously. After fifteen or twenty minutes remove it for a few minutes, or rub the skin with the hand to produce a good reaction.

For a rapid heart, as in fever, in organic heart disease, in

palpitation, and in exophthalmic goiter, nothing is better than the ice-bag fifteen minutes from three to six times a day.

BATHS FOR EXTREMES IN AGE

Perhaps the bathing of infants is not so generally neglected as formerly; nevertheless, the majority of children, especially in large cities, are under-bathed. It should be remembered that children under five or six years of age do not react well to cold water; therefore, it is not wise to undertake any heroic courses of cold bathing for infants or young children. Beginning with the infant of a few days old, the warm bath should be given daily, or at least every other day. As the child becomes a year old, the temperature of the water can be slightly lowered. At one to two years of age, the babe can be safely cooled by wetting the hands with water cooler than the bath. At three years of age, the child may be safely cooled off by pouring over it water somewhat colder than the warm bath. At four or five, he will stand cool bathing moderately well, and by the time he is five or six years of age, will react very well to all ordinary cold baths and cold finishings of warm baths.

People above sixty years of age, or those with hardened arteries and high blood pressure, cannot safely indulge in the vigorous bath practices of their earlier years. It is necessary to change the temperature in the alternate hot and cold baths very slowly for old pople. The skin is becoming leathery and inelastic. Likewise, the sudden application of very cold water is attended with more or less danger of rupturing the small blood-vessels in the brain. Even old people with high blood pressure can stand a moderate amount of cold water, and should always end their hot baths with short applications of cold; but it must be done more carefully and judiciously than in the case of the young and robust.

BATHING HINTS

1. Avoid a full hot or cold bath within two or three hours after a meal. Such local baths as fomentations, compresses, foot baths, and even sitz baths, may be taken an hour or two after a meal; indeed, compresses and fomentations may be applied immediately after a light meal without injury.

2. The temperature of the room during a bath should be 70° to 85° F., invalids requiring a warmer room than persons

in good health. Thorough ventilation is an important matter, but drafts must be carefully prevented.

3. Never apply either very cold or excessively hot treatments—to aged or feeble patients. Cold is especially dangerous. Very hot baths are rarely useful in health. The warm bath answers all the requirements of cleanliness.

4. Never take a cold bath when exhausted or chilly. Many have rendered themselves cripples for life by so doing. No harm will result from a cool bath if the body is simply warm even though it may be in a state of perspiration.

5. Cold baths should not be administered to women during the period of menstruation—unless there is fever with an extremely high temperature. Warm baths may be taken safely.

6. Carefully avoid giving "shocks" to nervous people or to those inclined to apoplexy or affected with heart disease.

7. The temperature of a warm or hot bath should always be decreased just before its termination, as a precaution against taking colds.

8. The face should always be wet before a bath; and the feet should be warmed—if not already warm—by a hot foot bath.

9. When any unusual or unexpected symptoms appear during a bath, the patient should be removed at once. In case symptoms of faintness appear, as is sometimes the case in feeble patients, during a hot bath, apply cold water to the head and face, give cool water to drink, lower the temperature of the bath by adding cool water, and place the patient as nearly as possible in a horizontal position.

10. In health, a cool or cold bath should be very brief, lasting not more than a few seconds up to one or two minutes. A tepid bath should not last more than ten or fifteen minutes. A warm or neutral bath may be continued thirty or forty minutes, or as long as may be necessary to secure the desired result.

11. It is of extreme importance that the patient should be carefully dried after any bath. A large sheet is much better for this purpose than a towel. A patient should never be left chilly after a bath. It is equally important that the body should not be left in a state of perspiration.

12. For feeble persons, an hour's rest in bed after a bath will add much to its beneficial effects.

13. If a bath is followed by headache or fever, something is wrong, either in the kind of bath administered, or in the manner of giving it. Headache indicates the use of either too great heat or cold, thus producing too violent a reaction.

14. It is not a good plan to swim vigorously just before or after eating, or to take any other form of extremely hot or cold bath immediately before or after the meal.

15. Those who fear cold water should begin by rubbing cold water or ice water vigorously on one part of the body at a time, like the two arms. Then rub the chest, the back, the legs, etc. In this way, within a week or two, even the most timid will learn to enjoy cold water.

16. In swimming, care should be taken not to overwork the heart, as it may be dilated and permanently injured. Remember that cramps are acquired on very hot days, especially when entering the water in a state of fatigue or perspiration.

17. The ordinary individual should have a healthy reaction following the cold bath and friction within one or two minutes. If the reaction is longer delayed, hot water should be employed before the bath.

CHAPTER XXXV

HEALTH ASPECTS OF CLOTHING

The real purpose of clothes is not display and adornment, but rather to protect the body from the elements of cold and heat, from injury, and adequately to satisfy the social demands of modesty. Man in his primitive innocence roamed this world, garbed in the scant attire of the savage, and it was only with the awakening of a social consciousness that clothes became necessary.

COLD WEATHER CLOTHING

The chief purpose of clothing is to protect the body in cold weather. The average man is unable to produce sufficient heat to keep the body warm during the winter unless the heat be conserved by means of clothing in close contact with the skin. The human body can resist heat far better than cold. The bare skin will withstand both the heat of the tropics and the enormously high temperature of the Turkish bath, but it cannot withstand excessive cold without some sort of protection.

The value of various clothing materials as heat-conservers differs greatly. *Linen* and *cotton* are good conductors of heat, and therefore are better suited to summer than winter wear, unless worn next to the skin with an outer garment made wholly or partially of wool. *Wool* and *silk* are both poor conductors of heat, therefore not adapted for warm weather clothing, but well suited for winter.

Several layers of clothing are much more useful in keeping the body warm than a single layer, even though that single layer be as heavy or heavier than all the materials composing the several layers.

If we take the naked body and represent its radiation of heat by one hundred, the ordinary woolen shirt will reduce the heat loss to sixty. A linen shirt, a woolen shirt, and a

vest reduce heat radiation to forty-six; while a linen shirt, a woolen shirt, and a coat and vest reduce the heat radiation to thirty-three per cent.

Furs are more ornamental than useful as they are ordinarily worn. They may, indeed, become positively harmful from the over-heating of a limited surface of the skin. To get the real benefit of fur coats they should be worn with the fur inside.

EXTREMES IN CLOTHING

Starched clothes are probably a little warmer during the cold season, as they lessen the radiation of heat from the body. Two thin suits of underwear will always prove warmer than a single heavy one, since the air space existing between them decreases the loss of heat.

The practice of attending balls and other evening functions clad in low-necked attire with no other outer wrap than a thin opera coat is conducive to chilling of the skin, frequently resulting in pneumonia and other internal congestions.

Great care should be taken not to over-clothe the body during the winter. Over-clothing debilitates the skin, producing unconscious perspiration, the evaporation of which exposes the body to chilling and subsequent colds. The skin must be kept warm, but it should be slowly and systematically trained to react to cold—to withstand ordinary drafts if necessary. In this way one may gradually build up a skin reaction which will prevent many attacks of cold and influenza. On the other hand, when going out of doors during the cold weather, do not forget to put on suitable outdoor wraps. While it is important not to over-clothe the body indoors, it is equally important not to under-clothe it when going out into the cold.

The habit of dressing children rather lightly for the purpose of hardening them and of inuring them to cold very often falls little short of cruelty and inhumanity. If immediate bad results from this practice are not noticeable, parents are often inclined to think well of it and do not take into consideration that they are planting the seed of future disease and are undermining the child's health. The use of short stockings and the exposure of several inches of bare legs to cold winds in chill weather must be not only uncomfortable, but decidedly dangerous.

WARM WEATHER CLOTHING

Clothing also serves the purpose of protecting the body against the heat of summer, the sunburn of the sunlight, and the dampness of the rainy day. The essential feature of summer clothing is porosity. The meshes should be large and the weave coarse. Abundant opportunity should be afforded for the elimination of heat. *White, gray,* or other *light-colored clothing* is better suited to warm weather, as it more fully radiates the light of the sun, thus protecting the body from the absorption of external heat, as well as aiding in carrying off the heat of the body. No starched clothing should be worn during the summer.

Black and *blue garments* are the most unsuitable for hot weather. These dark colors largely absorb the heat rays of the sun and transmit them to the body. They also absorb odors in a larger degree than light colors. Their only advantage (in reality a disadvantage) is that they do not show the soil so readily; but it must be remembered that they gather dirt just as quickly.

Since *white materials* reflect the heat of the sun, they are best for summer wear, but when they are very thin, much of the heat passes right through the clothing without being reflected. Therefore, the coolest possible garment for hot weather wear is obtained by employing a thin, white color fabric lined with a very thin, dark-colored lining. Such a garment will be found to be the coolest possible creation for summer wear.

PROTECTION AGAINST INJURY

Clothing serves to protect the skin against various injurious agents. Gloves protect the hands when performing rough work and during cold weather. Shoes protect the feet from bruises and from the heat and cold. Some great evangel of reform is needed to revolutionize the modern methods of clothing the feet. The Chinese are not the only race that deliberately distort their feet. Among the better classes of civilized races, it is almost impossible to find a foot that is not more or less permanently deformed. The shape and impress of the natural sole of the foot is almost entirely ignored in the making of the modern shoemaker's last. Use shoes built upon the more sensible and natural styles of the "army lasts."

Excessively thin-soled shoes are dangerous in both summer and winter. Colds in the head, disturbances of the bowels, and inflammation of the pelvic organs often result from long chilling of the feet. We cannot find language sufficiently strong to express our condemnation of the modern, close-fitting, pointed-toed shoe, with its ridiculous French heel.

The high-heeled shoe is especially detrimental to young girls. No mother should think of permitting her daughter, just budding into womanhood, to wear these absurd and health-destroying creations of fashion and folly.

It should be borne in mind that man has a foot unlike that of the monkey, whose foot much resembles the hand. Man's great toe, corresponding with the thumb, is the longest of all the toes; therefore, proper fitting shoes cannot be made after the lines of the glove, as our pointed-toed shoes are constructed, but must be built along the lines of the natural foot.

CLOTHING OF THE EXTREMITIES

The clothing of the extremities deserves more than a passing notice. The arms and feet represent parts of the body where the blood vessels are most exposed; where the blood is more easily chilled; where there is less of the warm blood and animal heat to keep the tissues warm. When the legs and arms are chilled, some internal organ is at the same time proportionately congested. It is a great mistake to put so much clothing upon the chest and abdomen, frequently entirely overlooking the extremities. Little girls with short dresses and insufficiently clad limbs and ankles are an invitation to pneumonia, and often when they are thus clothed at the critical period of their lives, the foundation is laid for a lifelong invalidism.

The present short-sleeved garments may be a hygienic blessing in the summer, but they are a positive curse in the winter, as the extremities are the parts of the body in special need of clothing during the cold season.

The pernicious practice of suspending *heavy skirts* from the waist is a curse both to the growing girl and the adult woman. This habit interferes with the proper circulation of the blood in the lower extremities, at the same time producing more or less congestion of the pelvic organs. The skirts should

be suspended by the means of proper supports from the shoulders or waist, or in some other hygienic manner which will avoid the dragging of these heavy weights upon the pelvic frame. If no other remedy can be found, it would be better to adopt some style of knickerbockers to be worn in place of cotton drawers and heavy skirts.

UNDERCLOTHING

In discussing underclothing, it must be remembered that individuals greatly differ, both in the sensibility of the skin and in the ability of the body to keep itself warm. Ironclad rules concerning underwear cannot be laid down. Much can be done to train the skin to better circulation and reaction; but this must be done very gradually, or else the skin may be chilled, and pneumonia and other serious diseases may result from an over-enthusiastic desire to harden oneself to the cold.

It seems superfluous to remind sensible people of the necessity of properly changing clothing with the change of seasons, or with a change in the weather during any one season. Underwear, overcoats, outer garments, etc., should be changed according to the season and the temperature as it varies from day to day. Unless there is a great change in temperature, it will be found best not to change the weight of underclothes from day to day, or week to week, but to meet these changes by shifting the outer garments or wraps.

While it is the habit of many people to change the underclothing for a lighter or heavier weight at the change of seasons, there are some, however, who wear the same weight all the year around, and who regulate their comfort by the weight and number of the outer garments. Where the change is made, especially from a heavy to a lighter weight, it must be done with care and judgment. It is best to make the change in the morning on rising, and to select a fine, mild day for the purpose.

We strongly advocate *the union suit* for boys and girls, men and women. Its advantages are many, chief of which is that it affords uniform covering of the skin without overlapping of garments in the region of the abdomen and pelvis, where they are least needed, and where undue accumulation of heat is undesirable.

THE QUESTION OF FABRICS

Linen absorbs moisture more readily than wool and dries twice as quickly. In the ability to absorb bodily moisture, *cotton* comes next; then *silk*. Quick moistening is a time-honored test between linen and cotton. This ability to absorb water largely and evaporate it quickly makes linen a very desirable fabric for underclothing with but this single objection; too quick evaporation of the perspiration from the underclothes will chill the skin. This single objection to linen as a material for underclothing is overcome by the wearing of cotton, or, still better, woolen outer garments. This arrangement permits the quick removal of the exhalations of the skin by rapid evaporation through the linen undergarments; at the same time prevents chilling by the slow passage of the heated vapors through the cotton and woolen outer garments.

All things considered, *linen mesh* is the best material for underclothing. The only thing against it is the cost, which prevents it from coming into general use. Linen is the ideal fabric to wear next to the skin, for the reason that it is comparatively light for the protection it affords, and holds the heat moderately well. It promotes a fair degree of heat radiation during the summer. But its chief virtue lies in that while it serves as a protection from cold, it permits of the free passage and evaporation of the moisture and gases which are exhaled from the skin; and herein lies the chief objection to both wool and cotton undergarments. Next to linen, cotton must be accepted as the best underwear, and wools and flannels must be regarded as the most unsatisfactory from almost every standpoint.

NECKWEAR

A great deal of eye trouble and headache is directly traceable to the wearing of tight collars and other close-fitting neckwear. These collars have the effect of constricting the throat and of interfering with the circulation of the blood. The neck is provided with large and important blood vessels which supply the brain and the organs of special sense. If this fresh supply is prevented from reaching the brain, or if the return of the impure blood from the brain is impeded, as is often the case when bending or stooping over when wearing a tight collar, the effects are necessarily injurious. The

effect is quite the same as when a string or rubber band is tightly tied around the finger.

It is also a great mistake to dress the neck too warm during the cold season. The wearing of heavy furs or enormous mufflers is weakening to the skin and productive of sore throats and colds. The only parts of the face in need of special protection from the cold are the ears. Such protection is best afforded by the ordinary style of ear-muffs.

HEAD COVERING

The fashion in hats is subject to frequent change, but the heavy hat, of whatever pattern, must rest under permanent condemnation. It is responsible for many headaches and much depression. And for the same reason all heavy mourning paraphernalia must be condemned as unhealthful. Some more hygienic means should be discovered for expressing one's sense of bereavement in the case of the loss of loved ones. Oculists have recently called attention to the fact that the wearing of *veils* is of more or less injury to the vision. Compelling the eyes to see objects through a network so closely placed before the eyes is found to be injurious to the sense of sight.

Straw hats, of course, are the ideal for both men and women during the summer; and the woman who has a heavy head of hair will find them most acceptable during the greater part of the year.

Men's stiff or felt hats should have small holes at some point in the crown to permit of the circulation of air. There can be little doubt that the rigidity of the hatband is more or less responsible for baldness on the part of men, as well as the exclusion of fresh air and sunshine from the hair by tight and close-fitting hats. This no doubt accounts for the fact that men are ofttimes bald on the crown of the head while the hair grows well about the borders of the scalp. The theory has recently been advanced that superficial breathing is responsible for baldness. There is no doubt something in this, but it still remains a fact that men, while they breathe much more deeply and normally than women, are the great sufferers from baldness.

CLOTHING HINTS

In order properly to meet the wants of the body, clothing must possess the following qualifications:

1. It must allow unrestrained action of every organ of the body.

2. It must secure equable temperature of all portions of the body.

3. Its weight must be as light as possible without sacrificing other necessary qualities.

4. It must be so adjusted to the body as to be carried with the lightest possible effort.

5. The wearing of tight garters by either men or women interferes with the circulation of blood in the lower extremities, especially the return circulation through the veins. Varicose veins and ulcers of the leg are both produced and aggravated by this practice.

6. Do not make the mistake of wearing underclothes or other garments at night which have been worn during the day. Likewise, great care should be taken properly to arrange the garments worn during the day, so that at night they may be thoroughly aired.

Waterproof clothing is sometimes worn as a protection against chill and dampness. Such garments prevent the evaporation of the sweat glands and other poisonous vapors from the body. For this reason they are unhygienic, and should be immediately removed upon coming indoors. Otherwise chilling of the skin and derangement of the circulation result from this retention of perspiration. If the underclothes are saturated with perspiration they should immediately be removed. Dry the skin quickly with a Turkish towel and put on dry garments.

Night Clothing. The matter of proper dressing at night deserves attention, because hygenic sleeping requires that the room should be cold. The ordinary loose nightdress is practically useless during the winter. Both men and women should adopt some form of sleeping garb which will protect the body, especially the lower extremities. Such protection is probably best afforded by some garment of the pajama type.

CHAPTER XXXVI

HYGIENE OF THE MUSCLES

As competition becomes more strenuous, the physically weak must go to the wall, the prizes of life unfailingly go to the strong—those who have "staying" power. In business and professional life no skill, no learning, no intellectual greatness can carry its fullest influence without a proportionate capacity for physical endurance.

MAN A WORKING MACHINE

The human body can perform more work with given energy than any machine ever devised. The combined strength of all the groups of muscles in the body is equal to lifting about six thousand pounds. One-half of this strength is in the legs, one-quarter in the arms, and one-quarter in the trunk. The human body is a great system of complex mechanical leverage, and at any and every point of inspection exhibits abundant evidence that man was made to work.

The study of anatomy shows the recumbent posture to be the proper one for physical rest. Anatomists tell us that man was never made to sit down. It is evident that man was made to stand up while working and to lie down while resting. There is little or no anatomical provision for the sitting posture; indeed, it is altogether possible that the sitting habit which has been acquired by civilized races is directly or indirectly responsible for a vast amount of deformity and disease, including weak lungs, spinal curvature, constipation, hemorrhoids, and various pelvic disorders in women.

A man who honestly earns his bread by the "sweat of his face," as a rule, needs but little instruction on the subject of exercise. Work that will produce sweating is a physical blessing.

Household duties may be arranged so as to afford all the exercise necessary to health, without interfering in the least with important work. Exercise undertaken for the carrying

out of some worthy purpose—a purpose in which the mind is deeply interested and the whole man engaged—is the most healthful exercise.

THE PHYSIOLOGY OF MUSCLES

When we desire to move any part of the body, an impulse is sent from the brain to a muscle or group of muscles. In every little muscle-cell a small electric spark, so to speak, is produced by this impulse. This little spark ignites the food-energy stored in the muscles producing a series of explosions and in this way the muscle is caused to contract—to work. Muscular work is always accompanied by the generation of heat. In fact, eighty per cent of the heat formed in the body is generated in this way by the muscles.

No muscle in the body under normal conditions contracts unless it receives a nerve impulse, but a muscle may be made to contract by a blow, heat, electricity, or by some chemical substance. Impulses are constantly being sent to the muscles, so that they are always in a state of slight tension—ready for immediate action.

Muscles are not merely mechanical instruments of energy, but are also storehouses of power. A great deal of the heat by which the body is kept warm during cold weather, as we have noted, originates in the muscles. This is the explanation of shivering and chattering of the teeth when one has been subjected to prolonged chilling. Muscular exercise increases bodily heat; therefore, when the body is chilled to the point of danger and its owner does not know enough to engage in physical exercise for the production of heat, Nature produces involuntary exercise in the form of shivering—which might be regarded as a sort of lazy man's exercise.

Muscles contain a substance which scientists have named *oxidase*. It is a digestive ferment which has power to oxidize; that is, to burn up the sugar which Nature stores in the muscles for this purpose. During contraction muscle tissues are also actually destroyed. A too rapid destruction of muscle permits the accumulation of various acids and other poisons resulting from tissue waste, and this gives rise to the local muscle soreness experienced after undue exercise.

Every breath we draw, every heart-beat, every wink of the eye, even every thought, generates the same or a similar phys-

ical element that so often strikes destruction from the thunder cloud—the same force that so mysteriously flashes intelligence around the world over ocean cables and by wireless energy. Every muscular contraction generates a current of electricity —(neuricity) the exact quantity and quality of which can be determined by the proper instruments of precision.

MUSCULAR FATIGUE

When we build a fire, the wood or coal gives off energy in the form of heat, but smoke goes up the chimney and ashes accumulate in the fire box. In the same way, tissue wastes sometimes accumulate in the working muscle more rapidly than they can be carried away by the blood-stream. These substances are acid poisons, and in time they tend to lessen the ability of the muscle to contract, by poisoning the end of the nerve where it comes in contact with the muscle-cell. We call these feelings of poisoning *fatigue*. If the muscle is relaxed, the blood soon carries away this waste, new nutritive material is supplied, and the muscle is quickly and fully recuperated. After very violent or continued exercise, all the muscles feel tired, and even sore, because of the accumulated poisons.

By means of a hot bath at 110° F. for ten minutes, and then at 100° F. for twenty minutes, these poisons are more quickly burned up and carried out of the muscle, and so these tired and sore feelings are promptly relieved.

This sense of fatigue is a demand of Nature for rest, for time to repair the used up tissues, to eliminate the poisons resulting from work. This provision Nature has wisely made to compel us to stop the vital machinery before it has become so much damaged that repairs cannot be made. This admonition comes with such force that it cannot be resisted for any great length of time. Unfortunately for the race, however, ingenious man has discovered that there are agents which will quiet or smother this warning voice, thus allowing the individual to go on destroying his tissues beyond the point of safety. Alcohol and tobacco are among the most active and frequently used of these substances, while tea and coffee belong in the same category. Very strangely, too, these agents are recommended and used for the very purpose which renders them most dangerous.

SYSTEMATIC AND SYMMETRIC EXERCISES

Physical exercise should be systematic and symmetric, not spasmodic and excessive. Man should cultivate his mental and moral faculties, as well as develop his physical powers. All his time and energy should not be spent in oiling the machine—exercising the physical body. Part of his time and energy should be devoted to mental and moral culture, a sufficient amount of physical exercise being taken to earn one's living and to keep the body in healthy working order.

Regular, light and, preferably, useful exercise is much superior to irregular and excessive athletics. No doubt much physical good has come from our modern school athletics, yet every physician is compelled to recognize many undesirable results from excessive exercise and over-physical training, chief of which is the so-called "athletic heart," which often appears several years after the discontinuance of extraordinary physical activity on the part of college athletes.

It is much better for the health to train and develop the heart and other muscles reasonably, than to over-train these organs when young, and be compelled to discontinue these active exercises in middle life. There is great danger of fatty degeneration of the heart and other muscles.

REQUIRED DAILY EXERCISE

The amount of daily exercise required has been the subject of much discussion in scientific circles. It is impossible to offer definite rules. Everything depends upon the individual, his strength, the condition of his muscles, etc. It is my opinion that for the average healthy man or woman, the daily amount of exercise which would keep the body strong and healthy is represented by a five or six-mile walk in the open air—arms swinging, chest well expanded. It should be remembered that this represents the sum total of exercise for one day. Now, if one does housework, works in the garden, walks to and from the office, climbs stairs, or engages in any other line of work calling into use various muscles of the body—this work must be subtracted from the five-mile walk. This walk is suggested as representing an agreeable form in which daily physical exercise may be profitably taken by ordinary individuals in good health.

Walking on a level surface at the rate of three miles an

hour represents an amount of physical work equal to lifting one-twentieth of the body weight through the distance walked, that is, a man weighing one hundred and fifty pounds, walking six miles, has done physical work equivalent to transporting seven and one-half pounds over the distance walked—six miles.

In walking observe the following rules:

1. Hold the head erect, with the hips well held back, the chest forward, and the chin drawn in.

2. Step lightly, with elasticity (not with a teetering gait), setting the foot down squarely upon the walk and raising it sufficiently high to clear the walk when swinging forward.

3. In walking, do not attempt to keep any part of the body rigid, but leave every set of muscles free to adapt themselves to the varying circumstances which a constant change of position creates.

The average workingman—day laborer—is estimated to do an amount of work equivalent to lifting nine hundred tons one foot high each day. This is equal to walking a distance of thirty-eight miles, or winding nineteen miles up the side of a mountain 5,000 feet high.

Stair-climbing can be made to serve the place of mountain-climbing. In order to perform the exercise of lifting one hundred and fifty tons one foot high (the daily required exercise for the average healthy person—equivalent to walking six miles), it would be necessary to go up and down an ordinary flight of stairs one hundred and fifty times during the day.

A good form of indoor exercise is "running in place"—such as taught at the gymnasium. "Heel raising" is another good form of exercise. Rising on the toes (raising heel two inches each time) fifteen hundred times is equal to walking one mile, or (in case of a person weighing two hundred pounds) lifting twenty-five tons one foot high.

SELF-RESISTIVE EXERCISE

In physical development and health exercise it is the heavy movements that count. Various forms of apparatus and other gymnastic work are good, but the average individual will not take time to patronize a gymnasium regularly. However, such persons can profitably engage in systematic exercise along the line of the various systems of so-called "self-resistive move-

ments." These systems of exercise are based upon the principle of exercising one group of muscles by means of resistance on the part of its opposing group; namely, to flex the arm slowly and energetically while at the same time causing the extension group of muscles powerfully to resist the flexor group, and then to reverse the exercise—extend the arm while the flexors strongly resist, all the while strongly imagining you are really lifting an enormous weight. This form of exercise is not only beneficial but economical, in that both groups of muscles are acting at the same time. The muscles are pulling against each other instead of pulling against dead weights.

EXERCISE BENEFITS

Cold hands and feet are the earmarks—pathological telltales —of the nervous or sedentary life. By contraction and expansion, the muscles directly influence the circulation of the blood, and therefore perfect circulation demands daily exercise of the muscles. Exercise increases the force and frequency of the heart-beat. Excessive, over-violent exercise may dilate the heart, and is always dangerous in weakened, aged or obese individuals, or those with hard arteries and weak hearts.

The time of special danger to the heart in the course of violent exercise is that point just before one gets what is commonly called his "second wind," a term signifying that the heart has become able to pump the blood through the lungs fast enough to accommodate the increased demand for oxygen on the part of the exercising muscles.

Physical exercise favors deep breathing. If you cannot breathe properly and deeply, run around the block, and then you will be able to breathe ideally in spite of yourself. Exercise creates a demand for air, as it does for water. It is therefore a cure both for deficient breathing and deficient water-drinking. In measuring the lung capacities of a large number of men and women, it has been found that the average man breathes but one-half of his capacity—one-half what he should breathe; while women are offenders to the astonishing degree that they breathe but one-fourth of their natural capacity.

Body work is absolutely essential to first-class brain work. The studied efforts of the health-seeker should be to secure well balanced exercise of both mind and body. The proper

nourishment and systematic exercise of the body contribute much to the healthful action of the mind and nervous system. Over-exertion is detrimental to the nerves and in no way helpful to either mind or body. Moderate physical exercise gives one the best command of the mental faculties, contributes very much to clearness of mind and calmness of judgment, and in every way favors all-round self-control.

There is no doubt that physical exercise is more beneficial when it is pleasant and enjoyable. This is true of all bodily exertion, whether it be the play of the child or the work of the adult. The more one puts his mind into his physical exercise—the more he himself enters into his bodily activity—the greater the beneficial results to both mind and body, and the less the unpleasant consequences of fatigue, weariness, and depression.

While we recognize the value, from the standpoint of light physical culture, of Delsarte and calisthenics (embracing Indian clubs, dumb-bells, wands, etc.), at the same time we are compelled to classify such exercises as belonging to that class of movements calculated to develop grace, harmony, and coordination, rather than belonging to exercises suitable for healthy muscular development. We would not be understood as in any way decrying these calisthenic exercises. They are all right in their place—certainly harmless at all times, and have some small exercise value; but they do not belong to the class of real body-developing and health-promoting activities such as walking, running, rowing, tennis, golf, and the occupation exercises as found in housework and the various trades.

HEALTH OF THE MUSCLES

Nature never attempts to maintain a useless organ, and almost as soon as an organ is not regularly used she sets to work to demolish it; or at any rate she wastes little or no time in trying to keep it in repair. This is true all through vital economy, and is nowhere more clearly seen than in the case of the muscular system. A diseased muscle soon becomes thin, pale, relaxed, and weak; and very shortly a change begins which is termed *fatty degeneration.* Nature does not think it worth while to keep so much valuable nitrogenous matter lying idle, and so she sets to work taking the muscle to pieces and carrying it away, little by little, for use elsewhere, depositing in place of the muscle substance little particles of fat.

There is a popular theory extant that exercise taken early in the morning is superior to that taken at any other time. For many busy professional men, especially lawyers, editors, authors, clergymen, teachers, and others whose vocations keep them mostly indoors, the morning may be the only time when exercise can be taken conveniently; and if not taken at this time it is likely to be neglected altogether. However, for most persons the middle of the forenoon is a much better time to take any kind of active or vigorous muscular exercise.

For poor sleepers, a half hour's exercise taken in the evening not long before retiring will often promote sleep. Vigorous exercise should never be taken immediately before nor within an hour after a hearty meal.

CHAPTER XXXVII

HOW THE BODY RESISTS DISEASE

The laws of Nature have been so arranged that health is the natural outcome of all the normal functions of mind and body. Disease, generally speaking, has to be cultivated, and some folks have to cultivate it assiduously in order to get it, as health is so contagious that many hygienic sinners can transgress the laws of life for a score of years before they finally succeed in getting the disease they have been all the while so persistently inviting.

Germs, or microbes, as they are more properly called, are the smallest living organisms with which we are acquainted. The majority of disease-causing organisms are not animals, but plants, and belong to the order of fungi, of which common mildew is an example. As regards their shape, the vast majority of them are either tiny round bodies or else very small rods. So minute are they that the highest powers of the microscope are needed for their detection. The germs of common colds are so small that 80,000 of them placed end to end would only measure one inch.

Malaria, sleeping sickness, and syphilis are caused by animal parasites.

BODILY PROTECTION AGAINST MICROBES

The human body seeks to protect itself against microbes by a number of different methods, among which may be mentioned:

1. *Germ-proof skin.* The skin of a human being is swarming with microbes, but unless it becomes diseased or injured in some way they are unable to get in. The seventeen square feet of skin which covers the average human being, if it is free from injury and without disease, is impervious to microbes. They are not able to get through it. This is also true of the eighty square feet of mucous membrane which lines

the stomach and digestive tract. It is also practically germ-proof when normal and healthy.

2. *Germicidal body fluids.* All of the fluids and secretions of the body, when normal, are more or less germicidal. A strong and healthy alkaline saliva discourages the growth of those microbes which flourish in an acid medium. A healthy human stomach secretes gastric juice which contains hydrochloric acid, and is a sure-fire germ killer. During the earlier part of digestion, before hydrochloric acid is present in abundant quantities, there is often found a little lactic acid which is also a mild germicide.

The bile and intestinal digestive juices are also all germicidal in varying degrees, though—sorry to have to record—there is one "bug," the colon bacillus, together with a few others, which has developed such a hardihood of growth that it will flourish in the presence of these alkaline digestive juices—so that this one "bug" has for the time being got the better of us and is found constantly present in man's large intestine.

3. *The living tissues.* The living tissues of the human body are all more or less germicidal. They are inhospitable to the presence of disease microbes, and they are endowed with certain powerful protective properties against the growth of disease germs. For instance, many of the special secretions not only serve to wash away microbes mechanically, as in the case of tears flowing from the eye, but they are also more or less germicidal when they are normal and healthy.

4. *The ductless glands.* Many of the ductless glands, about which you read so much, are of great importance in the body's scheme for defence against disease. This is especially true of the thyroid gland. This gland, we know, has something to do with the work of liberating antitoxins to help in the battle against toxins, no matter whether these toxins are formed by microbes, or reabsorbed (autointoxication) from man's bowel tract.

5. *The blood and lymph.* The two great circulating fluids of the body are strongly germicidal. In normal conditions of health, and in special conditions of disease, there are to be found numerous substances circulating in the blood stream which are germicidal in their action.

It seems, therefore, that the all-wise Creator, in drawing up the plans and specifications for the human body, has made provision for almost every imaginable emergency, but as we

study the problems of health and disease we find that not all of these defensive agencies are working in the most ideal or efficient manner. Man, as he has progressed upward in the scale of civilization, seems to have gone backward as regards some of his natural defenses against disease. It, therefore, becomes one of the pressing problems of the age to know how to recuperate man's biologic defenses against the menaces of an advancing civilization.

THE ELIMINATION OF MICROBES AND THEIR TOXINS

When hostile microbes invade the human body, the organism is at once provoked to put forth an earnest and united effort to expel the invaders, and this work of eliminating disease germs and their poisons is carried on by four different agencies. They are:

1. *The bowel tract.* When the digestive tract is infested by strange microbes, they may be eliminated in large numbers by the bowel, and some authorities have even maintained that the body is able to throw microbes out of the blood into the intestine. This is why it is so necessary thoroughly to disinfect the bowel discharges of persons who are suffering from such infectious diseases as dysentery, typhoid fever, cholera, etc.

2. *The skin.* In the case of more severe infections, disease germs are found to find their way out from the body through the skin, being eliminated through the sweat glands. This is sometimes observed to occur in the case of typhoid fever. For this and other obvious reasons, it is necessary to take great pains to keep the skin clean and active during all infectious diseases, by means of suitable bathing, etc.

3. *The lungs.* While the germs themselves are probably not eliminated bodily by the lungs, large quantities of poison are thrown off through the exhaled breath, during the progress of many diseases, along with the normal poisons of respiration.

4. *The kidneys.* The kidneys likewise take part in the elimination of both disease microbes and their toxins in many diseases, and in all cases they are concerned in the elimination of the germ poisons. Again, in typhoid fever the germs themselves are found in the urine and the same care should be given to disinfecting the kidney discharge as is devoted to the disinfection of the bowel discharge.

CRIPPLING OR DISABLING THE GERMS

And so we come to see how wonderfully resourceful is Nature in her battle with the microbe—in her efforts to defend the body against disease. If she fails to keep the "bugs" out, if she cannot eliminate the microbic invaders bodily, through the agencies already noted, then she sets to work utilizing her marvelous methods, her manifold means of crippling and disabling our ever-present microbic enemies; and this work of crippling or handicapping the microbe old Mother Nature carries out along a number of different lines, as follows:

1. *Attenuation.* Attenuation is a word we apply to those processes whereby the blood is able to decrease, or lessen, the disease-producing powers of certain microbes. And we also sometimes express it by saying that these substances in the blood are able to lessen the virulence of the microbe; so that it is this process of germ crippling, or handicapping, that we call attenuation.

2. *Agglutination.* There is present in the human blood a certain substance called agglutinin, and we are coming to look upon this agglutinin as being a sort of germ poison, or microbic chloroform, as we find it to be a substance which is able markedly to handicap the germs in their pernicious work in that it facilitates their capture and subsequent destruction. Under the influence of the agglutinins the germs are partially overcome. They are trapped; they are corralled; they are actually caused to gather together in little clusters where they huddle close up about each other, or in some cases they are caused to form themselves into chains—little elongated colonies. At any rate, in this way the microbes are rendered more or less helpless; and thus they are directly checked in their work of hostile pillage and plunder.

3. *The protective rôle of fever.* Scientists have discovered that when the temperature of the body is raised up to about 102° F., or 102.5° F., the multiplication of germs in the body is greatly retarded. This higher temperature is also now known greatly to encourage the production of antitoxins on the part of the body itself. And so we come to see that fever is a definite aid to the body in its struggle against disease. Moderate increase in temperature greatly enhances the chances of a sick man getting well. It is for this very reason that the physician now regards a temperature around 103° F. as a

good indication in pneumonia. If I had an elderly person with a severe pneumonia, and I came around on the third or fourth day and found the temperature only 100° F. to 101° F., I should have small hope for his recovery.

And so the reader can see why physicians to-day do not use anti-fever mixtures, or give fever powders, the way they used to. We do not want to destroy the fever, we merely want to control it, to see that it goes on burning up poison but that the temperature doesn't rage so furiously as to burn up the patient.

DILUTING MICROBIC TOXINS

Now, the reader should remember that in the case of many of our most dreaded diseases, it is not the germ itself that kills, but it is the circulation in the blood of the germ toxins that destroys life, and it should be known that all these microbic poisons are known by the general name of *toxins*. For instance, in the case of diphtheria the germs are in the throat, and, barring danger of death through strangulation from the overgrowth of the membrane in the throat, the mischief in diphtheria is done by these toxins in their effect upon the heart and kidneys—more particularly the heart. Ordinarily, in diphtheria, the microbes are found only in the throat, where they would account for the production of the diphtheretic membrane, but the general symptoms in diphtheria, the weakness, fever, etc., are due to the toxins which are circulating in the blood and which are carried to all parts of the body. Now the human body has two specific ways of fighting these toxins, in addition to those already noted, and they are:

1. *Inflammatory exudate.* Many times the microbes of infection are confined to some definite place in the body, the infection is localized, and, as a result, large quantities of the disease toxins are produced in that locality and are produced so rapidly that the body is not able to carry them off. There tends to be a local accumulation of disease poison. Now, in a case like this, the body sets up what we call an inflammatory process. This part of the body swells, if it is near the surface the skin reddens, and the main purpose of this inflammatory process is to enable the blood vessels in this afflicted region to exude what we call the "inflammatory exudate," a substance which is allowed to seep out through the blood vessel walls.

In other words, the arteries begin actually to leak out this germicidal fluid, which also serves the immediate purpose of diluting the toxins in this region.

Now it is in this way that these irritating, highly poisonous, microbic toxins, which would soon serve to kill the living cells, are so weakened and diluted, their power for mischief is so lessened, that the living cells in the neighborhood survive.

2. *Congestion of the blood.* Now, always in association with the formation of this inflammatory exudate, there is, as has been intimated, a process of active congestion. That means that greatly increased quantities of blood are caused to flow through the affected parts of diseased organs, and that thousands upon thousands of fresh and virile soldiers, the white blood cells, are brought to the scene of battle to fight for the threatened life of the living tissues. Not only does congestion favor the mobilization of the body's defensive troops, but it also enormously increases the quantity of germ-destroying serum which is poured out upon the battlefield.

Congestion is good and beneficial in the body's battle against disease just as long as it is active, just as long as fresh blood is being constantly brought to the seat of danger, just as long as it is being constantly exchanged and renewed. On the other hand, when congestion becomes passive, when the circulation is stagnant, then in many cases such passive congestion becomes rather an aid to the disease germs in their destructive work, especially if it is permitted long to continue.

BOTTLING UP THE MICROBES

When the invading disease germs become so firmly intrenched, so securely lodged within the body, that all efforts to eliminate them have failed; when the defensive processes so far described have proved of no avail in throwing out the enemy, then another wise and wonderful defensive process of Nature begins, an ingenious maneuver designed to bottle up, or encapsulate, the foe.

If Nature falls down in her work of overcoming and checking her enemy, then she starts upon a new tack, an effort to make these disease germs prisoners of war. She starts on a program of bottling them up. This wonderful process we call *"encapsulation,"* and if Nature is able successfully to carry out her program, it results in surrounding a colony of microbic invaders with emergency structures so dense and impenetrable

as to prevent their migration to other parts of the body, as well as to cut off their offspring from starting on tours of mischief-making and disease invasion.

Sometimes, too, this maneuver on the part of Nature results in the erection of a retaining structure so dense as to prevent —to some degree at least—the escape of the disease toxins, so that the whole disease process is so effectually bottled up that for the time being the patient is free from fever and other constitutional manifestations. Thus in this way the disease is held temporarily as a local process: the body at large is spared the disastrous results of a generalized invasion.

This bottling up process consists in the building of a strong wall about this colony of invading disease germs. Now, as the reader has already begun to see, it is these little white cells of the blood that play such an important rôle in the defense of the body against disease. At this time, these little *white cell soldiers,* after fighting the microbes with all their energy, after engaging in hand-to-hand mortal combat with their enemies, the disease germs—a battle in which many of the white cells are overcome and lose their lives—I say, after this intense and terrible struggle, these white blood cells line themselves up around the germs on all sides in final and determined battle formation, and strange to say, though fascinating to observe, they are found to range themselves in orderly fashion, in several layers, the leucocytes, or white blood cells, of one order, occupying the front ranks—taking the brunt of the battle—while another order of body defenders is lined up immediately behind, and still another rank of white cell soldiers is found holding the flank lines. All these different orders of microscopic body defenders press together in unison, and by utilizing the dead bodies of their fallen comrades they build up a solid, compact, and more or less impenetrable wall about their captured enemies, the disease-breeding microbes.

It is interesting, in this connection, to note that in their death agony these little white cell soldiers throw out, as it were, a death sweat, a sort of adhesive, sticky secretion, which constitutes a powerful cement and which binds together the bodies of the living and the dead in their effort to win the battle in this last-ditch struggle.

Now, it often develops that the germs are too many in number, or too vicious in behavior, to be thus conquered; that

the forces are unequal, and the white cell soldiers are defeated in the struggle, so that large pus cavities or actual *abscesses* may subsequently develop by the breaking down, in one or more places, of this wall of defense which was so ingeniously built up by our valiant little soldiers. But many times they do succeed and the infection remains hard—it does not "come to a head"—but after a week or ten days has fully disappeared. These are the cases in which the leucocytes win the fight.

The question would naturally be asked by the reader: "What will become of such a captured colony of bottled-up microbes, in case the white cells are successful in hemming them in and walling them off?" This is the answer: These same little white cell soldiers which have succeeded in capturing their enemy and bottling him up are able to excrete from their bodies a fluid which contains a substance similar to pepsin, the substance which dissolves meat fiber in the stomach, and this pepsin-like substance is able literally to eat its way into the germs, it actually dissolves them—digests them, and later these dissolved and digested microbes are absorbed, taken up by the surrounding fluids in the tissues and carried off in just the same way that a piece of meat or the white of an egg is dissolved by the pepsin of the gastric juice in the stomach, afterward to be absorbed into the blood through the walls of the digestive organs.

NEUTRALIZING, MODIFYING, AND DESTROYING TOXINS

And so we begin to get a very real picture in our minds of the struggle that is going on day by day and hour by hour in the human frame divine. But we are not through yet. There are still other details, in this battle between health and disease, that we must enumerate; and we will, therefore, next examine the changes which may be wrought upon disease toxins by means of the body in its effort to lessen their harmfulness, or to eliminate or neutralize them altogether. In this effort the body employs several different processes.

1. *Neutralization by antitoxin.* Antitoxin is the thing that, after all, saves our lives in many a struggle with the microbe. For every toxin which a disease germ can produce within the system, the human body itself, if it is virile and healthy and if given time, seems to be able to manufacture an antitoxin. These antitoxic substances are manufactured by the body under

the stimulus of the disease poison, and they are able, partly or completely; to neutralize the microbic poison, the germ toxin, in just the same way that an acid will chemically neutralize an alkali. There is some sort of satisfying union which takes place between the two, and this combination results in the formation of a new substance which is quite neutral and harmless to the human system. This is the way the antitoxin of diphtheria works.

2. *Opsonins.* Doctor Wright, an English investigator, found in his study of blood, more particularly the white blood cells and their behavior in various diseases, that the white cells were reluctant to attack certain disease germs, but that they could be encouraged to move forward to the attack by a substance which is found circulating in the blood, and which he called opsonin. It would seem that opsonin is either a sort of chloroform, which stupefies the microbes and puts them to sleep, or in some other way weakens them so that the white cells are more willing to attack them; or it may be, as someone has suggested, that opsonin may serve as a sort of condiment to make these otherwise unattractive germs look like good food to the white cells. Still others have suggested that the opsonin may serve as a sort of stimulant or tonic to the white cells, serving thus to stiffen up their backbone, as it were, and encourage them to braver and better efforts.

One thing we know, that in some diseases the blood itself may be swarming with white cells, but if the opsonin is not present the white cells show no disposition to attack and overpower their little enemies; opsonin, then, becomes a highly important factor in the resistance of the body against disease, and, of course, in the last analysis it may turn out to be a substance that belongs to one of the general classes we have already discussed.

When, for instance, a patient has pneumonia, opsonin is not found in the blood until about the time of the so-called "crisis," although the blood usually contains enormously increased numbers of white cells; but they are largely inactive; they will not fight; but when the opsonin appears the whole situation is changed. Almost instantly the white cells begin an immediate and concerted attack upon the pneumonia germs all along the whole firing line of the body's defense. The crisis of the disease is precipitated and the patient is soon on the way to recovery.

LIVING FORTIFICATIONS

The lymph glands constitute a great system of breastworks, a sort of last line of defense, a chain of protective forts, which effectually back up the advance guard and firing line of the body's defensive army. When the white blood cells and the various defensive activities already mentioned are unable successfully to cope with the invaders, or the enemy comes from without in such vast hordes and is so powerful and virulent as to sweep aside the usual defenses of health and life, then it is that these disease microbes must pass through this special system of fortifications distributed throughout the body for its final defense against the invasion of disease foes.

1. *These lymph glands* are, therefore, sort of forts, within which are to be found the sturdy lymph cells, a specialized rank of the white blood cells, and, after methods in every way similar to those employed by the white blood cells, these lymph soldiers are able to put up a stiff fight against the advance of the disease microbe. And when the battle waxes hot these lymph glands may enlarge, or as we commonly regard it, they become inflamed—they swell up—and thus the field of battle is enormously enlarged and the possibility for producing new lymph soldiers is enormously increased.

So that, while the swelling of a lymph gland, as seen in so-called scrofulous and other conditions, is an evidence that the body is poisoned, that it is invaded by a host of unfriendly microbes; nevertheless, it also indicates that old Mother Nature is rising nobly to the occasion and is multiplying her means of defense against the invading hordes. The swollen and enlarged lymph gland means that Nature is enlarging her fortifications. The sensible thing to do is to coöperate with this wonderful healing process within the body, and seek in every way possible to help Nature in her tremendous struggle against the germs.

2. *Certain fixed cells.* Certain cells of the body which are stationary, such as endothelial and epithelial cells, are also found to take on ameboid movements in an emergency, and assist their brothers, the white blood cells, very materially in the work of devouring and destroying disease-breeding intruders.

3. *The omentum.* The omentum is a great vascular apron which hangs down in the abdominal cavity, from the region

of the stomach, and which has power, when germs enter the abdominal cavity and inflammation and infection are threatened, to extend itself even down into the pelvic cavity and there, by means of its great vascular supply, to bring more of the fighting white blood cells to the scene of battle, to bring more blood to nourish the struggling tissues, and to carry away the poison secreted by the invading microbes. During surgical operations, we often find the omentum adhering in some far-off corner of the abdominal cavity, which finding is a silent testimony of the vital struggle of former days.

THE WHITE CELLS, LARGE AND SMALL

I don't know that we have made it clear that there are two, yes, even three, sizes of white blood cells, but we are more particularly interested in the two sizes that compose the two main classes of these interesting little bodies which form our standing army of defense against disease. The large white cells have a large nucleus and they constitute less than five per cent of the total number of white cells found in an individual's blood. These large white cells show a great preference for an animal diet. They are the fellows that go out and eat up the dead tissues and débris that is scattered about a wound. They go out and mop up the battle field after the struggle is over.

And when under the influence of certain irritant poisons, such as those absorbed from the intestinal tract in cases of chronic constipation, they sometimes behave very strangely, especially in those individuals whose body cells are more or less weakened as the result of approaching old age and senile decay. These large white blood cells have been caught in the act of preying upon the body itself. Under the spell of metabolic poisons, and some authorities also think as the result of being chronically poisoned by alcohol and nicotin, as well as other drugs; I say, under the spell of these poisons, these former valiant defenders of the body against disease turn insurgent. They pounce upon the body cells, and have been caught in the act of devouring brain cells, liver cells, in fact, under such perverted conditions they do not hesitate to feed upon any part of the body that happens to be in a weakened state, showing, however, great preference for a diet of nerves, brain cells, and other of the more highly organized tissues. And who can say but that this would be a simple explanation for

much of the loss of memory and many other symptoms of decrepitude that are attendant upon old age?

So then, we see that in many cases of *old age,* these very patriotic cells which, under ordinary conditions, defend the body against disease, depart from their former habits of rectitude and virtue and devote their energies to destroying their own fellow body cells, thus contributing to atrophy, sclerosis, and if we believe some authorities, even gray hairs. For it has been discovered that these white cells can creep out through the roots of the hair, scrape the paint off the hair, eat it up and carry it away. And now, if we are to believe these stories of people turning gray in a single night—I say, if we are to accept such legends, maybe the explanation would be found in a sudden migration of these little fellows out into the hairs, so that they made a thorough clean-up job in the short space of one single night. At any rate, such reprehensible conduct on the part of our white cell soldiers, might very aptly be called the "treason of the body's standing army."

Now, the smaller of the white blood cells contain a nucleus very much divided, so that it resembles a chain of sausage, and they constitute about 70 per cent of the total white cells of the body. This sausage-like nucleus permits these little fellows to go through a very small opening, and we know that they are able to penetrate even solid bone. These smaller white cells are the chief fighters and they always occupy the front ranks in every army of advance and in every alignment for defense. There is on record an experiment in which ten millions of germs were, in twenty minutes, reduced to nine thousand by a small battalion of these valiant little soldiers. Experiments of this sort, of course, are conducted in a test tube, or under other laboratory conditions which permit of continuous observation.

The career of a white blood cell is a very hazardous one, and while it has been estimated that there are about thirty thousand million red blood corpuscles in a human being, there are only about sixty million white cells. That is, on a peace time footing the body's standing army is about sixty million. Or, to put it in another way, in a cubic millimeter of blood as we use it for examination purposes in the laboratory, we have about five million red cells and about seven thousand five hundred white cells; in fact, that is known as the normal white cell count. We speak of a patient having a *leucocytosis* when the white cell count is enormously increased; and in acute tonsilitis,

appendicitis, etc., it is not uncommon to have a white cell count ranging anywhere from fifteen to twenty thousand up to thirty or forty thousand. Such a high leucocyte count always means infection somewhere in the body—pus.

Now, it is believed that the average length of life of many of the white blood cells in less than twenty-four hours, so that, owing to the hazardous nature of their calling—their rôle as the police force of the body—it is necessary to provide for their constant renewal. We do not know, altogether, just where these cells are created in the body, but we know that the healthy individual keeps his standing army from depletion by constantly recruiting large numbers of these body defenders freshly from their place of origin. In view, therefore, of the comparatively short life of the blood cells, it has been computed that white and red cells are created in the body at the following prodigious rate:

Blood cells created in one day about 700,000,000.
Blood cells created in one hour about 30,000,000.
Blood cells created in one minute about 500,000.
Blood cells created in one second about 8,000.

CHAPTER XXXVIII

HOW TO INCREASE VITAL RESISTANCE

Having sketched the story of how the body defends itself against disease, it may be well to offer a few practical suggestions as to how we can help old Mother Nature to succeed in this unseen struggle which is imposed upon her in the effort to save man from the increasing weaknesses generated by his ever-advancing and more highly artificial habits of civilized living.

It is highly important that we should know how to coöperate with Nature in her efforts to resist disease. Of course, this coöperation must be largely dictated and regulated by the immediate struggle in which the body may happen to be engaged, but preventive medicine is by far the most valuable part of the work of avoiding disease. An ounce of prevention is literally worth a ton of cure, when it comes to increasing vital resistance.

We ought to treat our microbic diseases before we get them. By this I mean we should learn to develop such a store of so-called vital resistance, and acquire such a stock of exuberant energy, as to render the physical constitution well-nigh impregnable to the onslaughts of disease microbes.

HYGIENE IMPORTANT

Now, how are we going about it to coöperate with old Mother Nature in this business of increasing our supply of vital resistance? The answer to that question is a big order. We cannot go into the details here. It embraces the whole realm of public and personal hygiene; sanitation, on the one hand, and decent living on the other; not excepting the state of one's mind. It means that we must learn how to breathe properly, how to eat sanely, to exercise moderately, to use sunlight and fresh air; that we must learn how to keep our bodies clean on the outside by bathing, and on the inside by

abundant water drinking. It means we must learn that health is a matter of sowing and reaping; that we cannot expect an increased health harvest without indulging in a preceding season of intelligent health sowing. Briefly summed up, it means we must learn how to live the natural life, the simple life, the obedient life; it means that we must learn to obey the laws of life, for the laws of life are just as much the laws of God as are the Ten Commandments.

If you want to be healthy, live out of doors as much as possible. Man was intended, by his Maker, to be an out-door animal. Many modern disorders, like colds, tuberculosis and pneumonia, are "house diseases." Eat an abundance of good food, but don't over-eat. In this connection, I think the American people eat too much meat and too little green stuff, too little of the fruits and vegetables. Study foods a little, find out how much you need to keep you well and strong and in good weight, and then eat and keep your mind off your digestion. One of the quickest ways in the world to get dyspepsia is to get your mind focused on your stomach. Eat your meals like the early disciples ate theirs, "with gladness of heart," chewing your food fairly well, and then trusting the rest of the process to your wonderful powers of digestion.

NUTRITION AND ELIMINATION

See to it that your blood does not become too highly acid, for that interferes with the activity of the white blood cells. Remember that meat, eggs, and cereals are acid producers. They are good foods, but they are acid producers; therefore, in times of disease and infection, when you have a raging fever, you should eat little or none of these articles of diet. On the other hand, remember that dairy products, fruits and vegetables are alkaline producers and they are, therefore, the foods of which to eat more freely in times of disease and danger. All habits of living which tend to keep the blood over acid tend to lower the individual's resistance to disease. Excessive acidity of the blood interferes with the fighting power of the white blood cells.

See that the bowels move regularly, at least twice a day. The poisons of constipation not only interfere with the action of the white blood cells, but, as already noted, may even so pervert their action as to lead them to turn against the body and begin to devour the living cells and tissues themselves.

Train yourself to give prompt attention to the calls of Nature when it comes to bowel elimination.

Again, if you want to keep the body in good trim to resist disease, *avoid taking poisons* with your food and drink. A lot of people are constantly poisoning their blood stream, and adding to its acidity, thereby directly decreasing the efficiency of the white cell soldiers, by the daily use of large quantities of such substances as tea, coffee, tobacco, alcohol, aspirin and other forms of headache or sleeping powders, not to mention scores of patent medicines and other nostrums. Better get out of the self-drugging business. If you are going to take drugs, you would better let your physician prescribe them and regulate their use.

HELPFUL HINTS

Any thing which promotes good circulation of the blood is of value in increasing resistance against microbic diseases. All forms of hygienic bathing, and even the morning cold bath (provided you are strong enough to react to it and do not have headache and chilly feelings following it) is useful, together with all other forms of hot and cold bathing. Even fairly frail patients can take those cold baths which consist of rubbing one part of the body at a time with a Turkish mitten dipped in ice water, and thoroughly drying that portion of the body and covering it before treating another part. This is one of the ways we help to build up the resistance of bed-ridden patients.

Sometimes the *cold bath* can be borne better if it is preceded by a hot bath. Cold baths for tonic purposes, for increasing disease-resistance, must always be short. Long cold baths are debilitating, and predispose to catching disease. You know you cannot ordinarily give a hen anthrax, but if you let it stand in cold water up to its knees, for several hours, it will take the disease.

Don't forget that *fresh fruit juice* increases the alkalinity of the blood, and therefore increases the individual's resistance to disease, by encouraging the fighting qualities of his white cell soldiers. Yes, I mean sour fruit juices too, lemonade, orangeade, grapefruit. The free use of these is the quickest way to alkalinize the blood. Just the opposite of what you expect, I know. So when you are coming down with a cold

or infection, don't use whiskey and quinin, for these are two of the most powerful acidifiers known. These drugs paralyze the action of the white blood cells. On the contrary, stir a teaspoonful of soda into a glass of lemonade and drink it down while it effervesces.

And last, but not least, have a conscience *void of offense* toward God and man. Get rid of fear as well as all its bad associates, such as pessimism, anxiety, worry, etc. These bad mental states all interfere with digestion and the circulation, as well as controlling the ductless gland secretions of the body to a greater or less degree, and they constitute a powerful influence which, by their depressing effect upon the body, predispose it to catching disease. In a word, optimism is a good health practice, and if not carried to extreme, and provided the physical foundations are otherwise favorable, is a valuable aid in completing the body's defense against disease.

MAN IS MIGHTIER THAN THE MICROBE

As a general rule, barring certain wide-spread epidemics and excepting certain cases of hereditary predisposition to disease—I say, as a general rule, the healthy man is not attractive to the disease microbe. Disease ordinarily attacks those who have first weakened their resistance to its encroachment by persistent transgression of the laws of health, or by continually subjecting themselves to insanitary surroundings. Of course, heredity has a lot to do with our ability to resist disease. Disease-resistance is an inborn trait, and is much better in certain individuals, in some families, and even in certain races, than it is in others. For instance, the Irish race, and the Negroes, are much more susceptible to contracting tuberculosis—as compared with the Jews.

We thus see that the human body is the scene of an incessant conflict between the physical life forces on the one hand, and ten thousand agents of infection and disease which constantly surround us and which are always seeking for a mischief-making entrance to the human body. Now the sum total of all the forces whereby the body resists disease or combats infection is commonly known as the individual's "vital resistance."

But let me emphasize to the reader the fact that it is only when a man has weakened himself, from some cause or other —when he is, after all, potentially sick—that he offers induce-

ments for microbes to prey upon him. Ordinarily, disease is contagious only to a weakened organism. Now there are certain clear-cut exceptions to this general rule, as for instance, "flu" epidemics. It seems sometimes that the stronger a person is the sooner he is attacked and the more rapidly fatal the plague becomes, but this is only the exception that otherwise proves the rule.

Health abounds in every breath of fresh air, in every muscular movement, in every normal courageous thought of the mind. In brief, health is the natural estate of the human race. Disease is something that results from wrong habits of living, or unwholesome environment.

SUNLIGHT AND VITAL RESISTANCE

The foremost of modern scientists agree perfectly with the teachings of the Old Book, which declares that man was made to live in a garden. Modern biologists are coming to look upon man as an out-door animal. Physicians are becoming more and more convinced that the maintenance of health and the recovery from disease are mightily influenced by the number of hours an individual spends each day in the sunshine of the open air. All students of hygiene recognize that the more mankind lives out of doors, the better the health, the fewer the diseases from which they suffer, and the more quickly they recover from most bodily afflictions.

Carefully compiled statistics show that the vital resistance of any family or group of families is in an exact inverse ratio to the number of years they have been away from the soil; that is, the longer you have been away from the farm—from the outdoor life of fresh air and sunshine—the more likely you are to contract disease, and the more difficult will be your recovery. On the other hand, the shorter the time you have been away from the farm—the outdoor life—the more vital resistance you have, the less likely you are to contract disease, and the more quickly and surely you will recover from any accidental infection or other malady. While this is true generally speaking—nevertheless—in more recent years the country has not kept pace with the city in sanitary progress, and, as a result of this hygienic backwardness, the well-regulated and hygienically safe-guarded large city has in some respects, become a healthier place in which to live—more free from disease—than the small village or even the country itself.

WHAT IS IMMUNITY?

It is a well-known fact that some persons, although repeatedly exposed to certain diseases, never contract them. It is equally well known that when a person has had yellow fever, smallpox, and certain other diseases, he is not likely ever again to suffer from these infections. Why is this? It is due to what doctors call immunity. What is immunity? Briefly stated, the theory of immunity is as follows:

It is supposed that the cells of the body have certain abilities to combine with the poisons of disease. This ability of the cell to unite with poison might be represented to the mind by saying that each cell had a number of little chemical arms. In conditions of health, these arms are probably devoted to the work of taking up food to nourish the cell; in disease they have power to reach out and take hold of poison. These arms are called receptors; and one of the theories of contagious diseases and other infections is that the poisons circulating in the blood are united to these little receptors of the cells. Under the influence of the disease, the cells are stimulated to make large numbers of extra receptors, and it is thought that receptors may be even thrown out from the cell and circulate in the blood as the anti-toxic bodies before mentioned.

In hereditary immunity, it is supposed that the individual is born with these receptors for some particular disease either absent, or else all satisfied previous to birth. In acquired immunity, these receptors of the cell are supposed to be all satisfied when an individual has the disease once—say, for instance, typhoid fever—so that typhoid fever poisons that may enter the blood in the future are not able to attach themselves to any of the body cells. And this would confer life immunity. In the case of some diseases, such as diphtheria and others, it would seem that the receptors do not remain long satisfied, and so after a short lapse of time, a few months or years, the individual can have the disease again.

Immunity is sometimes spoken of as "natural" and "artificial"—natural immunity referring to the process of saturating the cells of the body by means of natural reaction to the disease when once contracted; whereas artificial immunity refers to such instances as vaccination against smallpox, and diphtheria anti-toxin. In the latter case, the horse has diphtheria and develops large numbers of anti-toxin bodies, which

are thrown out into the blood; and then this blood is found to be effective in destroying diphtheria poisons when introduced into the blood of a child suffering from diphtheria. In the other case, the cow has smallpox and develops a milder form of disease called cowpox; then the immunity developed by the cow against the disease (and many of the immune bodies are found circulating in the blood of the animal) is administered to man by means of vaccination. In this way the patient gets the benefit of the cow's immunity, and hence it is termed acquired immunity.

It must not be forgotten that man, when perfectly healthy, would probably be immune from many diseases. Hence, what we term immunity in this connection here, is merely an effort to explain the processes whereby the body, when once it has had a disease, will not, in some instances, ever again contract it, while in others it will be found immune for many years. It is not altogether known just how this immunity is conferred, but the foregoing is representative of the numerous theories advanced by scientific workers who are searching along these lines.

CHAPTER XXXIX

PREVENTION OF CHILDHOOD DISORDERS

From the first day of an infant's life to adolescence, it is a matter of concern in the promotion of health and the prevention of disease, that the child should have its life so regulated as to result in the formation of habits of regularity as regards eating, sleeping, playing, etc. There should even be a regular time, morning and evening, for bowel evacuation. In every way the child's health will be promoted by attention to this simple matter of system and regularity. This advice is doubly important in the case of nervous children—the children of neurotic parents.

INFANT FEEDING

It is out of the question in a book of this size and nature to go into the details and intricacies of modern infant feeding. That subject we have given full treatment in a separate volume, but in this place it will be permissible briefly to review the fundamental principles of the feeding of infants and children with special reference to the prevention of disease.

It goes without saying that the only ideal food for infants is mother's milk, and this is just why in former times, in some foundling asylums, the mortality of new-born babies was as high as 90 per cent. In general, during the last fifteen years the infant mortality in the United States has been cut right in two. That is, only one-half as many babies now die under one year of age as died fifteen or twenty years ago. In some localities the improvement is even greater than this. Owing to the improved milk supply of our larger cities in recent years, the city has become, in a way, a safer place for the baby to be born, and a healthier place for it to be raised in the earlier years of life, than the country.

In Russia more than half of the babies die before they are one year of age. In Germany about one-fifth die during the first year. Not less than one-half of these deaths are to be

attributed to constitutional disorders arising from infected cow's milk, for we find that among the babies who die under one year of age, about 90 per cent are artificially fed; only ten per cent are feeding at the mother's breast.

Sterilized milk. In the large centers of population at the present time most of the milk is pasteurized. This treatment results in destroying the vast majority of the disease-producing microbes but it also destroys the important vitamins, but this is not a serious matter since a little orange juice or a little tomato juice will supply the infant with the necessary vitamins, while he takes his milk free from disease-producing bacteria.

In case your milk is not pasteurized, it is better to pasteurize it at home or boil it. A great deal of the prejudice against boiled milk in past years we now know to be unfounded. Most of the objections urged against the use of milk sterilized in this way were without basis.

Whatever the method of modifying cow's milk—and there are several acceptable methods—the one great thing is to have clean milk, milk as free from germs as possible.

Statistics show an increase in the average length of life in this country and this increase is almost entirely due to the cutting down of infant mortality, which, in turn, is largely due to the improved milk supply which has decreased the frightful death rate of the summer diarrheal diseases and has also done something to cut down the tuberculosis death rate.

MODIFIED COW'S MILK

The method of feeding infants best adapted for universal use by the average baby is that devised by Drs. Holt and Shaw and supported by the authority of the American Medical Association.[1] Whole cow's milk is diluted with water because its fat and curd (or proteins) are not so readily digested by babies as the same ingredients of human milk. Also because cow's milk contains more than double the percentage of proteins found in human milk. Sugar is added because it is a normal ingredient of milk. Cow's milk contains less than human milk and when cow's milk is diluted there is all the more need for adding sugar.

[1] "Save the Babies," prepared for use in Baby Health Conferences for the Committee on Public Health Education Among Women, by Drs. L. Emmett Holt and Henry L. K. Shaw. Council on Health and Public Instruction, American Medical Association.

Milk sugar or malt sugar should be used for most babies. Ordinary sugar agrees with some infants, but accustoms them to an oversweet food. Lime water is used because it prevents the formation of too hard a curd in the infant's stomach, or, in other words, makes the cow's milk more digestible.

Beginning on the third day, the average baby should be given 3 ounces of milk daily, diluted with 7 ounces of water. To this should be added 1 tablespoonful of lime water and 2 level teaspoonfuls of sugar. This should be given in seven feedings.

At one week the average child requires 5 ounces of milk daily, which should be diluted with 10 ounces of water. To this should be added 1½ even tablespoonfuls of sugar and 1 ounce of lime water. This should be given in seven feedings. The milk should be increased by ½ ounce about every four days. The water should be decreased by ½ ounce every eight days.

At three months the average child requires 16 ounces of milk daily, which should be diluted with 16 ounces of water. To this should be added 3 tablespoonfuls of sugar and 2 ounces of lime water. This should be given in six feedings. The milk should be increased by ½ ounce every six days. The water should be reduced by ½ ounce about every two weeks.

At six months the average child requires 24 ounces of milk daily, which should be diluted with 12 ounces of water. To this should be added 2 ounces of lime water and 3 even tablespoonfuls of sugar. This should be given in five feedings. The amount of milk should be increased by ½ ounce every week. The milk should be increased only if the child is hungry and digesting his food well.

At nine months the average child requires 30 ounces of milk daily, which should be diluted with 10 ounces of water. To this should be added 2 even tablespoonfuls of sugar and 2 ounces of lime water. This should be given in five feedings. The sugar added may be milk-sugar or if this cannot be obtained cane (granulated) sugar or maltose (malt sugar). At first plain water should be used to dilute the milk.

After three months, sometimes earlier, a weak barley water may be used in place of plain water; it is made of ½ level tablespoonful of barley flour to 16 ounces of water and cooked for twenty minutes.

At six months the barley flour may be increased to 1½ even tablespoonfuls cooked in 12 ounces of water.

At nine months the barley flour may be increased to 3 level tablespoonfuls cooked in 8 ounces of water. The milk mixture should be pasteurized from the start and 1 to 2 tablespoonfuls of orange juice should be given daily.

A MORE SIMPLE METHOD

The United States Public Health Service is endeavoring to promulgate through its publications a much simpler method of feeding babies than with modified milk. Skimmed milk should be fed only during the first week of life. At the beginning of the second week one part whole milk and two parts skimmed milk are given. After the end of the second week one will use half whole milk and half skimmed milk, while during the fourth week a mixture of three parts whole milk and one part skimmed milk is given. Beginning with the second month, whole milk is fed, but this should not contain over 3 per cent of fat. Cities require that milk shall contain more than this amount of fat, although some Holstein cows give milk containing less. One must find out from one's milkman or city authorities what is the fat content of the milk used, and then take some of it off to leave a milk containing only 3 per cent of fat.

Thus, from a quart of milk, after standing four hours, which contains 4 per cent of fat, remove the upper 1 2/3 ounces (4 tablespoonfuls); from a quart of milk containing 4.5 per cent of fat, remove the upper 5 tablespoonfuls; and from milk containing 5 per cent of fat, remove the upper seven tablespoonfuls, to get a 3 per cent milk. The amount of milk which is fed daily should be equal to one-seventh of the weight of the baby up to three months of age; one-eighth of the weight from three to six months, and after that, from one-ninth to one-tenth of the infant's weight. Thus, for a month old baby who weighs 9 pounds, or 144 ounces, one would use one-seventh of this, or 20 ounces divided into eight feedings, given in the twenty-four hours. Each feeding consists of 2½ ounces supplied at intervals of two and one-half hours, although more milk may be given at a feeding if the baby demands it. This arrangement permits of a nap of at least four hours in the night, and it may be extended to seven hours—from 10 P.M. to 5 A.M.—by training, in which case the amount in each

bottle may be increased so as to give 20 ounces in the twenty-four hours.

PREVENTING SUNDRY DISEASES

It will not be necessary to repeat in this place the necessity of having adenoids and diseased tonsils removed from children in order to prevent rheumatism, chorea and heart disorders.

Enlarged lymph glands in the neck (scrofula) or elsewhere in the body should receive early attention. If they are long persistent, they are probably tuberculous and they should receive treatment by means of light, X-ray and tuberculin injections in order to prevent the spread of tuberculosis to other parts of the body.

Adolescent goiter and its prevention has been noted in another chapter.

Also the matter of preventing common colds, to see that they do not "hang on" and thus lay the foundation for pneumonia or tuberculosis of the lungs, or allowing them to spread to the ear and thus contribute to deafness in some degree, has already been discussed.

Much trouble, as well as embarrassment in later life will be avoided in case the teeth come in irregularly or the jaws are deformed from adenoids, thumb sucking, or other causes, if the child is early taken to the dentist so that these matters can be corrected at a time when it is possible to afford almost complete relief.

The importance of vaccination as a preventive of smallpox and the necessity for its early employment in the case of children, need not be reiterated here, as the subject was given full consideration in another chapter in connection with the discussion of smallpox.

All children should be subjected to the Schick test as elsewhere directed in order to ascertain if they are vulnerable to diphtheria, and when an epidemic is present they should be given not antitoxin, but the more sure preventive, the more recent preparation—toxin-antitoxin.

Before children are removed from a safe water supply or allowed to travel over the country they should be vaccinated against typhoid fever. Combined typhoid and para-typhoid vaccine is almost a sure preventive of this dread disease.

Rickets and similar disorders are considered in the chapter devoted to nutritional diseases.

As years pass, I more and more advocate the routine *circumcision* of male infants. The operation, if performed during the second week of life is a trifling matter to the child, and since it is a real necessity in about twenty-five per cent of boy babies, I think it is a good plan, when viewed both from the standpoint of health and from that of morals, to perform the operation during the second week as a routine practice. Since this matter is given more extended mention in another chapter, we will not here repeat what is there said in support of this practice.

THE PUNY CHILD

Usually the puny child is constipated, hands and feet are cold, and he jumps and starts at any unusual noise, thus showing a tendency to nervousness. One of the first things necessary is to take this little one to a good specialist and if necessary have the adenoids and tonsils removed. This having been done, the diet should be carefully looked into. There should be served him for breakfast a generous bowl of dextrinized grains with a good portion of diluted cream, a glass of rich milk, a baked potato, and fruit. For lunch at twelve o'clock he should be given a glass of malted milk with egg, or eggnog, six or eight dates or three or four figs, a handful of pecan kernels, and perhaps a lettuce sandwich. For dinner at half past five, another nourishing meal of baked potatoes, a protein dish of either cheese and macaroni or eggs or meat, a generous fruit salad, a glass of rich milk, and bread and butter, should be enjoyed.

There is no class of little folks who eat between meals more often than do delicate children, for mothers painstakingly endeavor to feed these children all they can possibly take; so one mother thoughtlessly went about it something like this: The half past seven breakfast having been only touched—nibbled at—with the ten o'clock hour came this request: "Mother, I am so hungry, I want something to eat." Eagerly the mother prepared either a meat sandwich or a jelly sandwich and possibly a glass of milk.

When it was time for the twelve o'clock dinner or lunch, again the well-filled plate was refused, the appetite having been satisfied at ten o'clock. Having taken very little nourishment at noon, by half past two the plaintive plea again came

to the mother's ears: "May I have a piece?" and again the well-meaning mother gave him the desire of his heart. So the day passed, the dinner making the fifth time food was taken into the stomach, and in all probability there was eaten a cookie in between. The reader can readily see that the digestion was consequently very much disturbed, fermentation occurred, decomposition of food took place in the digestive tract with its result—constipation.

Not a morsel of food should pass the lips of any child, and particularly our delicate child, between meals. Let him come to the table at half past seven or eight o'clock, and if he does not want to eat tell him frankly that that is all he is to receive until twelve—and stick to it. Nothing more than water or fruit juices should be taken between meals.

PREVENTING DEFORMITIES

In the matter of preventing deformities such as round shoulders, spinal curvature, hump back, flat foot and weak arches, a number of things must be taken into consideration. Deformities often depend upon muscle weakness which can be corrected by proper exercise and physical training. At other times deformities are due to lack of calcium in the blood, to deficient bone formation. This can be prevented by eating proper calcium containing foods or by taking calcium phosphate with the meals as ordinary table salt is used. It is highly probable that in many of these cases that thyroid substance or parathyroid substance should be added to the calcium in order to make it stick in the blood. In the third case, fresh air, outdoor life, and abundant sunshine must be used in combating these disorders.

In many cases of deformities, the blood should be tested to make sure that syphilitic infection is not present. Still further deformities should be combated and prevented by proper posture in sitting, walking, standing, etc.

In case of spinal curvature, X-ray pictures should be made to see that there is no tuberculosis or other infection of the bone.

In a work of this kind we cannot go into the details of the prevention of these diseases, as they are fully treated in works devoted to the care of children.

Knock-knees and bow-legs can be remedied by suitable

braces or by surgical operation. Most cases of bow-legs are due to allowing children with rickets to try to stand and walk too soon.

The tendency to flat feet seems to be hereditary in some races like the Negro, but it more often comes as the result of wearing improper shoes, and by the teaching of the child to toe out which was so common in recent years, when in reality, the right tendency of the human foot is to toe in slightly.

Ankle weakness is further contributed to by wearing of high heeled shoes. Flat feet may be prevented by the following exercises taken in bare or stockinged feet:

1. Walk about the room three to five minutes with the toes pointing inward and the heels slightly raised from the ground (on tiptoes).

2. With the toes turned in walk on the outer border of the feet three to five minutes.

3. Stand with the toes turned in, quickly raise the heels, and slowly come down on the outer borders of the feet (three to five minutes).

4. While standing, rise on the toes, turn the heels outward; lower the heels slowly to the floor.

CHAPTER XL

CONTAGIOUS DISEASES OF CHILDHOOD

While the diseases discussed in this chapter are not exclusively relegated to childhood—while they may be contracted by adults, in fact are sometimes unusually severe in adults, as in the case of measles in elderly persons; nevertheless, in the vast majority of cases, these ailments are experienced during childhood and they confer, as a rule, life-long immunity.

MEASLES

Of all the epidemic diseases of childhood, measles is the most fatal to the nursing babe. The average layman does not seem to have a great fear of measles, and this is what makes so much trouble for the health authorities in fighting a measles epidemic. Be it far from us to try to implant a fear of disease in the mind of the layman, but the fear of epidemic diseases is commendable—not a fear that leads to useless worry, but a fear that leads to caution. In the case of measles and other contagious diseases, we need forethought leading to intelligent precaution and not merely panicky fear-thought that leads to worry and needless anxiety.

Measles is one of the most readily communicable of all the contagious diseases, ranking with smallpox.

Measles is so highly contagious that it was long thought that the virus was carried by the breath of an infected person, but this is probably not the case. Measles is not now thought to be an air-borne disease, but that its infection is spread by little droplets of moist infective matter coming from the nose and throat, as is the case with scarlet fever. This is the method of contagion known as *droplet infection.*

An attack of measles usually confers life immunity, but second attacks are not uncommon, being much more common

than the other eruptive fevers, some persons having the disease three or four times.

Measles is especially fatal when introduced among new peoples, as in the case of the Fiji Islanders. Over twenty-five per cent of the population died in four months when the disease first appeared.

Symptoms. Measles begins with a slight fever and other symptoms which very much resemble an ordinary cold. In three or four days the eruption appears and it usually begins to fade away by the second or third day. The fever ends, and the patient is over the attack. The rash appears on the thirteenth or fourteenth day after infection.

Now the thing we fear in measles, instead of running this normal and uncomplicated course, is that infection of the lungs, pneumonia, or inflamation of the kidney—acute Bright's disease—will appear following the apparent passing of the chief measles symptoms.

In times of measles epidemics, school children should be examined every day as they will often show measles patches in the back of the mouth several days before an eruption appears on the skin, as well as showing redness of the eyes, coryza. In fact, it would be a good plan to keep all children away from school who have colds when a measles epidemic is on. To close the schools in an epidemic of measles is probably of little or no value.

Adults not having had measles during childhood are very susceptible to the disease; and in the case of sickly persons it is sometimes very severe, often resulting fatally.

Prevention. Prevention of measles is one of the most difficult problems which confront health officials. In fact the disease is so highly contagious that it will probably never be controlled until a successful vaccine is developed, as in the case of smallpox. If the public could be aroused to recognize the danger of measles and overcome their indifferent attitude thereto, it would help a great deal. This is one of the diseases that parents sometimes foolishly expose their children to that they may "get it and be over with it while they are young."

The older the child gets from its nursing days up to adult life, the less the likelihood of death or serious complications in measles. Therefore, every effort should be made to prevent children acquiring the disease as long as possible.

Children exposed to measles—since the incubation period is about ten days—should be kept away from school at least two weeks. Measles comes on just like a cold, with running nose, sneezing, fever, coughing, and sore eyes. The eyes in particular are inflamed, watery, and sensitive to light. A person may acquire measles from a sneezing patient at a distance of ten to twelve feet.

Whereas one-half of the children in a home may escape scarlet fever in case of isolation, it is very rare that children in the same home will escape measles unless the isolation is in the hands of experts. One important fact about measles is that the contagion is of short life—the germs of measles apparently only live about two hours after they leave the body—so that serious attempts to disinfect a sickroom after recovery are not necessary. After measles give the patient a good bath, air and sun the room, and there will be no danger of spreading infection.

The important thing to remember about measles is that it is highly contagious during these three or four days before the eruption appears and this is why all children with colds and fever should be sent home from school, and why they should be isolated at home, that is, if they have never had measles.

SCARLET FEVER

It is a question whether we have as yet found the germ which causes scarlet fever, though several recent investigators claim to have isolated an organism that belongs to the streptococcus or erysipelas group. Sooner or later the real microbe of scarlet fever will be discovered, isolated, cultivated, and we will have either an antitoxin or a curative serum.

One thing we know about scarlet fever and that is that the infection is spread from mouth to mouth. The contagion is carried in the secretions of the nose, throat, and mouth. The droplets of moisture which are thrown out from the body in talking, coughing, sneezing, and spitting serve to spread the disease.

The death rate varies greatly in different epidemics. It sometimes prevails as a very light disease and at other times the death rate is as high as thirty per cent.

Remember this, the longer you can put off a child having scarlet fever, measles, or any of these contagious diseases of

childhood, the better chance it has of living. The largest number of fatalities occur in children under six years of age.

Causes. The disease has been transferred from man to animals by swabbing the throat of a scarlet fever patient and then planting this infectious matter in the throats of chimpanzees and monkeys.

Scarlet fever seems to be favored by the overheated atmosphere which prevails in our living, working, and school rooms, during the winter. It is a significant fact that the scarlet fever death rate rises as we go north from New Orleans to St. Paul, being 3 per 100,000 in Mobile; 5 in Memphis, 10 in Louisville; 18 in Chicago; and 30 in St. Paul. It thus appears that scarlet fever is a cold climate disease and its spread must be related to the overheated condition of the atmosphere of our homes and schools. Probably the greatest thing we can do to fight scarlet fever is to keep children out of close, stuffy, overheated rooms. Good ventilation will certainly serve to decrease this disease and lessen loss of life from its ravages.

Scarlatina is simply another name for scarlet fever. It is not a milder form of the disease as is so commonly understood.

Many epidemics of scarlet fever have been traced to infected milk. This infection has been secured in some cases apparently from infected udders in the cows, but in most cases was due to the milker who was probably a "scarlet fever carrier."

The disease is largely spread by persons going about with mild attacks, not knowing they are afflicted with the disease. Such individuals, especially if they are handling food or connected with dairies or engaged in the distribution of milk, are able sometimes to inaugurate whole scarlet fever epidemics. A whole epidemic of scarlet fever was traced to a single milkman who had a discharging sore on his finger following an attack of scarlet fever.

Symptoms. Scarlet fever appears within a week after exposure, and first manifests itself by fever and sore throat. In about twenty-four hours the typical fine scarlet rash appears, fading away within a week to be followed by scaling of the skin, which usually appears on about the eighth day of the disease.

The important thing about scarlet fever is the throat and not the rash. Sometimes the rash does not even appear, or at least is not noticeable.

Children under ten are most susceptible; nursing babies are rarely attacked. After the tenth year, resistance to scarlet fever seems to increase. Ninety per cent of the fatal cases occur in children under ten. Much of the immunity of later life may be due to the fact that when young, the child had a light attack of scarlet fever which failed of diagnosis. It was regarded perhaps as only a severe cold.

Isolation. We must remember that the microbes of infection are not in and of themselves airplanes. They cannot travel on their own initiative except in case they are borne by a breeze. They must be promptly carried from one individual to another, as every hour that lapses from the time they leave the sick person until they reach a new candidate for the disease, gives an opportunity for sunlight and other germ killing agencies to get in their work of disinfection.

In the case of scarlet fever, as in all other contagious diseases, the isolation must be complete. Nothing must pass from the sick to the well without being sterilized, and this is why children with scarlet fever and other contagious diseases fare better if treated in a hospital devoted to such disorders. There is scientific isolation as well as scientific care, and at the same time, it tends to lessen the spread of the disease. The death rate in properly conducted hospitals for these diseases is always lower than in the case of those treated in homes.

It would probably be much better to conduct the treatment and to isolate and quarantine scarlet fever on the throat findings and not on the rash and the scaling. It is more likely that the contagion is almost entirely carried by the throat secretions and not by the scales. If the throat continues sore, the patient continues to be infective. A scarlet fever patient is contagious from the time the sore throat starts until all infection in the nose, throat, and ears is over, until all discharges have stopped. It is believed that scarlet fever is only spread in moist or recent secretions. It is doubted by most authorities that the old or dried secretions can spread the disease.

Prevention. Until we master the microbe of scarlet fever the chief mode of prevention consists in isolation and disinfection.

It is important that those in charge of the medical inspection of schools should recognize the light cases and thus prevent the outbreak of scarlet fever epidemics.

Should the schools close when scarlet fever breaks out? That depends on the circumstances. In country districts it is probably advisable, as the children can be separated, but in the city, probably little is gained as the children mingle so freely they will spread the disease.

When scarlet fever is treated in the home, the patient should be isolated and the directions of the attending physician respecting the wearing of gowns, disinfection and sterilization, carried out. All discharges from the mouth, nose and respiratory passages must be collected and burned. Bed clothing, personal clothing, dishes, thermometers, and everything else entering the sickroom must be disinfected before they leave. Remnants of food and other things leaving the sickroom must be observed to see that they do not spread contagion.

Before putting a contagious disease patient in a room for isolation, every unnecessary article should be removed from the room, especially those that cannot be readily disinfected, such as books, curtains, rugs, upholstered chairs, bric-a-brac, etc.

There is little danger of the nurse, attendant, or mother carrying infection if she wears a cap and gown in the sickroom, removes it in another room or at the room entrance before leaving and washes her hands properly.

If children are sent away from home to avoid scarlet fever they should not return under eight weeks from the beginning of the scarlet fever attack, and not then if the patient's throat is still sore or if there is a discharging ear.

At the conclusion of the disease, the room *can be disinfected,* although it is probably just as well to wash things thoroughly and to allow fresh air and sunlight to do their sterilizing. If the room is sealed up by pasting paper over all cracks of doors and windows, the room can be fumigated by means of formalin candles, sold by the druggist, but at least twice the quantity recommended should be employed. The room should be fumigated for twelve hours.

Articles in the sickroom which cannot be sterilized by boiling, should be disinfected with solution of 1 to 1000 bichlorid of mercury or 5 per cent solution of carbolic acid.

Two Chicago doctors feel that they have been successful in

securing a scarlet fever antitoxin from immunized horses, and we await with considerable interest, the further testing of this new antitoxin.

DIPHTHERIA

In the case of diphtheria, we know the germ that causes the disease. Seven years after Clebbs discovered this microbe, von Behring announced the discovery of the antitoxin which has since come to be the standard remedy. We have had this information for a quarter of a century, and yet we still have diphtheria. The physician is abashed at the prevalence of diphtheria in the presence of antitoxin and toxin-antitoxin, but we should remember that the ravages of this disease have been enormously decreased in recent years. Twenty-five years ago, diphtheria used to come as a veritable plague.

The *diphtheria microbe* gains entrance to the body through the nose and mouth, most often through the mouth. This germ may go down through the throat to the stomach and produce infection in the bowels, but it rarely gets that far or even into the lungs. It is usually arrested at some point in the throat in the neighborhood of the tonsils. As a rule the diphtheria bacillus does not get into the blood of the patient. While breathing or swallowing may carry them into the body, they are usually promptly killed by the germicidal secretions there met with.

The real mischief of the diphtheria microbe is that it builds for itself a nest in the throat, and from that place sends forth its poisonous toxins to be absorbed by the blood, to circulate through the body, and create mischief in the kidneys, heart and nervous system.

These toxins also are sucked up by the lymphatics and that is what causes the swelling of the glands at the outside of the face and neck. This enlargement of the lymph gland shows that old Mother Nature is on the job, increasing her defense against the spread of the poison.

Milk and other food may become infected and contribute to the spread of the epidemic.

The bacillus is very delicate and is soon killed if exposed to air and sunlight.

Symptoms. Diphtheria usually appears in forty-eight hours after exposure. There is sore throat, moderate fever, general aching. The throat on examination appears to be

red and often the gray membrane can be seen early in the disease. Later the glands of the neck and around the ear and at the angle of the jaw swell and the pulse runs about ten beats higher than would be expected from the degree of fever present.

This diphtheria toxin is diluted by the blood stream and acted upon by various other agencies and while it poisons the whole system, it poisons the cells of the heart and nerves much more, and this is why we have such a rapid heart in diphtheria and have numerous other nervous symptoms, including paralysis.

Diphtheria in the nose is much more serious than that of the throat and tonsil. While diphtheria may affect the kidney it is not so likely to do so as in the case of measles and particularly scarlet fever.

One of the complications of diphtheria is when the membrane extends into the windpipe and threatens suffocation.

A local disease. Now why is it that the diphtheria bacillus does not spread like other contagions? It is probably due to the fact that it is a very virulent organism. As someone has said, "It sears like a red hot iron whatever surfaces it touches." When it lodges in the throat or on the tonsils, it starts out immediately to kill every living cell in the neighborhood. This destruction of tissue calls forth a reactive secretion of serum from the cells in the neighborhood but even this is quickly coagulated by the toxins of the diphtheria microbe, and this whole mass of coagulated tissue and serum constitutes the grayish, bleeding structure which is called the *diphtheritic membrane.*

Now all of this conflagration results in sealing up the lymphatics and the blood vessels so that the diphtheria infection is walled off, localized, isolated. This explains why the bug of this infection is so seldom able to invade the blood stream, why it is a local disease so far as the organism is concerned, but a systemic disorder as the result of its toxins which spread on their mischief-making mission throughout the body.

Diagnosis. When the microscope began to be used in making a diagnosis of diphtheria, it was found that many cases of sore throat that theretofore had not been recognized as such, belonged to the diphtheria group. We now know that the diphtheria bacillus often causes a form of sore throat or tonsilitis which may not be very severe in the individual but

which, because such an individual is a carrier of the disease, may be transmitted to others and start up virulent diphtheria. We do not always have a patch or a membrane in a diphtheritic sore throat, and now we know that the diphtheria bacillus can be harbored in the throat of carriers without producing any throat symptoms whatever.

When in doubt about sore throat, call the physician, or report to the health authorities and have cultures made. Diphtheria is too serious to trifle with; the diagnosis is too easy to warrant speculation.

Antitoxin. As far as the treatment of diphtheria is concerned, there is but one treatment, and that is antitoxin and plenty of it. The dose should vary according to the stage of the disease, rather than the size or age of the patient. If a throat has been sore less than forty-eight hours, two to three thousand units will be enough. Such a dose at the end of the second or third day would do little good. Five thousand units should be given by the third day, and ten thousand after that.

Since the use of antitoxin in diphtheria, it is seldom necessary to introduce tubes into the throats of children to prevent suffocation. The antitoxin causes the membrane to melt away something like a piece of ice in the sun.

We have diphtheria antitoxin because of the fact that the horse will contract the disease and form antitoxin in his blood, and from this horse blood the antitoxin is made, standardized, tested, and prepared for use in fighting the disease.

Does antitoxin cause paralysis? No. Then why do we see more cases now than before antitoxin was used? Simply because of the fact that antitoxin, by lessening the death rate, enables the patient to live to the time when the paralyzing effects of the diphtheria toxin are manifested. In the severe cases, the majority of them used to die and of course they would not live to become paralyzed. Now antitoxin saves them and has been thoughtlessly blamed for producing the paralysis. Paralysis also appears in cases in which the antitoxin is given too late.

Sometimes, in from one to three weeks after injecting antitoxin, skin rashes appear, which itch and often there is a slight fever and vomiting with swelling of the joints and glands. This condition is known as *serum sickness*. But these conditions are never serious and death is not produced by antitoxin except when the person may have previously received

an injection within a short time before—that is, within a week or two.

Antitoxin produces trouble in certain types of nervous individuals, those affected with asthma, hay fever and particularly those who are subject to disturbances from the inhalation of horse dandruff, etc.

Immunity. Immunity to diphtheria is largely an antitoxic one and only lasts for two or three weeks. In fact, in some individuals following this short-lived immunity, one attack of diphtheria seems really to predispose to subsequent attacks. Children between three and ten are most susceptible.

It is believed now that more or less permanent immunity in the case of diphtheria can be secured by the new toxin-antitoxin method. After three injections, one week apart, of about fifteen drops of the newer toxin-antitoxin mixture, 90 per cent of persons previously susceptible, as shown by the Schick test, are found to be immune.

This method of producing immunity by the diphtheria toxin-antitoxin mixture has been largely practiced in institutions to prevent outbreaks of diphtheria and should be employed in private practice to protect children against this dread disease. When a period of 2 to 3 months has elapsed after injection of the last dose of diphtheria toxin-antitoxin mixture the Schick test should be again done to be sure that immunity to diphtheria has been established.

Croup. In other days we heard much about membranous croup, but nowadays we know that this is a form of diphtheria, although children do have ordinary colds which may be accompanied with spasm in certain types of children. When a child is unusually croupy we should consider whether or not there is diphtheria in the neighborhood. Is the child frequently bothered with sore throat? Are the child's lymph glands enlarged? Is this attack of croup any different from ordinary attacks if the child is of the croupy variety? If the child has croup a little immediate administration followed by cathartic and ordinary good care is all that is required. If the child has diphtheria it needs antitoxin.

Sometimes these croupy cases that are not diphtheria will be relieved by giving them a teaspoonful of syrup of ipecac.

The Schick test. Everyone should understand that it is possible now to inject a little diphtheria toxin into the skin and

to judge by the reaction, whether or not the person is susceptible to diphtheria. It is interesting in this connection to note that the Shick test shows about 90 per cent of new born infants to be immune and about 80 per cent of adults, while in children from one to five it varies from 25 to 50 per cent.

In the Schick test 3 drops of dilute diphtheria toxin are injected into the skin of a person. Directly a white spot appears at the site of the needle puncture, and if the individual is susceptible to diphtheria, some redness, swelling, and a pimple will appear at this point within twenty-four to forty-eight hours.

In persons not susceptible to diphtheria the antitoxin in their bodies neutralizes the irritant effect on the skin of the toxin injected, and so no local inflammation occurs at the site of the injection. The toxin used in the test is a poison developed by the growth of diphtheria germs. It is standardized for the test, so that the human dose is equal to one-fiftieth of a fatal guinea-pig dose.

It seems to be the consensus of opinion among health authorities that all persons who have been exposed to diphtheria should have a prophylactic dose of antitoxin. The Schick test however will probably better serve in most of these cases as it will show whether or not the person is likely to take the disease as the result of the exposure.

It should be noted that diphtheria carriers always give a negative Schick test since they are immune, owing to the large amount of antitoxin in the body; while in actual diphtheria, the Schick test is positive owing to the absence of antitoxin in the patient.

Prevention. The modern practice of giving children in families where diphtheria has appeared, 1000 units of antitoxin, does render them immune from the diphtheria for a few weeks, but it does not hinder their harboring the bacillus in their throats and carrying it around to other families in the neighborhood, since they are allowed to go free. We must remember that diphtheria antitoxin is antitoxin, not an antibacillus substance. It protects us from the toxin of diphtheria but it does not do anything to kill the germs themselves. This is something the public must come to understand.

In former times the world was turned upside down to keep

a well child away from the sick. They would even be sent out of town. Now since the reign of antitoxin has come on this vigilance is relaxed and the well children are allowed to be with those who are carriers of the disease, so while we are indeed lessening the death rate of diphtheria, we are not—owing to this carelessness and other sorts—I say, we are not lessening the number of cases of diphtheria. All this is indicated by the fact that in some localities we now have a larger number of cases of diphtheria each year than we had twenty-five years ago.

Antitoxin has been a godsend in lessening the death rate but it has also rendered the public careless in carrying out isolation and quarantine.

It is claimed for the newer method of vaccination that it will do away with some of the objections, that it will protect not only the children in the family, but the children in the neighborhood. Let us hope this will be true of the improved diphtheria prophylactic inoculation.

Those who are taking care of diphtheria patients are advised to use throat gargles. Perhaps they are not very efficacious, but they are no doubt of some value. Diphtheria attendants should wear gowns and caps. Everything taken from the room should be boiled or disinfected in a 5 per cent solution of carbolic acid. In all of these diseases, such as scarlet fever, measles, as well as diphtheria, the attendants should be careful that the patient does not cough or sneeze in their faces.

Diphtheria is another of the diseases spread by *droplet infection,* by coughing, speaking, sneezing; or by being conveyed from one person to another through toys, pencils, food, handkerchiefs, books, etc.; although it is more largely spread directly from person to person.

Convalescents should not be released from quarantine until at least two cultures from the nose or throat are taken.

As in the other contagious diseases, the spread of infection must be combated by proper attention to dishes, towels, handkerchiefs, and other articles which have entered the sick room.

In case of diphtheria all dogs and cats should be excluded from the premises. They are both able to contract the disease.

There is no danger of those who have died of diphtheria infecting anyone. The disease is largely spread by convales-

cents and those who are carriers and who go about with mild sore throats.

WHOOPING COUGH

Sometime back the germ of whooping cough was found, and as the result we now have what is known as the "pertussis vaccine," which is of great help in controlling the symptoms of this disorder. The control of whooping cough has been very unsatisfactory and about the only way to diagnose was to listen for the "whoop" and no doubt many of the mild cases never whooped, or if they did, perhaps only once or twice throughout the attack. It is a disease practically relegated to children as most grown persons have had it, and it is not a serious matter if properly handled, in children, after babyhood.

Mothers are unnecessarily frightened by the paroxysms of coughing, and we frequently observe a child who seems to be on the point of expiring, and in five minutes he may be found engaged in normal, enthusiastic play.

However trifling a disorder to the older children, it is one of the greatest causes of death in nursing babies and the mothers' dread of whooping cough is justified.

Whooping cough probably kills more young babies than we know because it induces pneumonia, and that is probably often given as the cause of death. It is evidence of carelessness when we stop to think that we lose over 10,000 persons, chiefly very young babies, each year in the United States from whooping cough.

The incubation period of whooping cough is one to two weeks.

Symptoms. Whooping cough starts out like an ordinary cold, accompanied by a cough, and for a week or more cannot be told from simple bronchitis. It gets worse by the end of a week and by the tenth day, the whooping usually begins. The germs are found in the nose and throat from the onset until the whoop appears. After that it is not possible to isolate the germ.

A typical coughing paroxysm consists of a dozen or more short coughs during which the child grows blue, appears to be suffocating and then draws a long breath with a crowing sound (the whoop) and many times the whole paroxysm ends with vomiting.

In measles there are cases that never break out, and in whooping cough there are cases that never whoop. However, these cases are just as "catching."

Quit listening for the whoop. It is just a detail. It kills no child. Medicines to stop it do not succeed and would do no good if they did. Attention should be concentrated on saving the child from pneumonia or other secondary effects.

Management. Someone has summarized the management of whooping cough as follows:

1. All children without coughs should be kept away from all coughing children.

2. All babies should be scrupulously kept away from all coughing children.

3. The isolation (quarantine) of cases of whooping cough should begin as soon as the cough starts (ten days before the whooping begins) and be kept up for two weeks and sometimes three.

4. It is doubtful if it is necessary to continue the quarantine until the whooping stops—at least the latest literature is to the effect that quarantine can be terminated before the whooping stops.

5. Whooping cough children should be kept from over-exercising as this tends to bring on paroxysms of coughing. They should also be kept away from dust or other fumes that would irritate the lungs.

6. In the case of whooping cough it seems of little use to placard the house. Someone has suggested it would be of great service if we could tag the patient. In this way the "whooper" could be allowed to go out in the fresh air and yet everybody could be warned away from him, if he carried a danger signal of some sort. Whooping cough children who are being taken out for a walk could appropriately wear a large red cross on their arm, or display it in some way so as to warn other persons, particularly children, away from them.

Prevention. Whooping cough is spread by droplet infection just like measles and scarlet fever. Dogs and cats also have the disease and it may be that they help to spread it and keep it alive in a community. The susceptibility to whooping cough rapidly decreases after five years of age. One attack confers more or less life-long immunity; second attacks are very rare.

Towels, handkerchiefs, pencils and toys often serve to

spread the disease from one child to another; though droplet infection as the result of sneezing and coughing is the chief mode of spreading the disease.

Infants under six months are usually comparatively immune, but from six months up they are highly succeptible until after five years of age.

When the whooping cough vaccine is taken it should be started as soon as the disease is suspected or as soon as the diagnosis is made. The vaccine most used is the one that is not only made from the whooping cough germ but includes also other germs that are commonly found associated with the disease. It is believed that this new vaccine will afford immunity in about 90 per cent of cases. If this is true, then it ought to be more generally used in the case of children over five years of age, and if its use could be made general the death rate from the disorder would probably soon show a decrease.

MUMPS

For some reason the health departments of this country have never come to take mumps as seriously as some mothers do. The disease is highly contagious and has an incubation period of about 18 days. Most persons who have not had the disease, contract it if they are exposed.

Experiments have been made with more or less success of injecting two teaspoonfuls of the blood of a person who had recently recovered from the mumps into a person recently exposed. This method certainly serves to prevent mumps. At least it is worth trying in juvenile institutions where large numbers of children are exposed, as experience shows that in cases of that kind about half of the children exposed will catch the disease.

Mumps are contagious before the symptoms appear and for several weeks after they have subsided.

Symptoms. The disease begins with chills and aching sensations, loss of appetite, dryness of the mouth, soreness of the throat, slight fever, and sometimes nausea and vomiting. Within forty-eight hours the parotid gland, usually on one side, begins to swell, and becomes painful. There is difficulty in opening the mouth and swallowing, and this swelling lasts in average cases about a week. About the time the gland on one side begins to subside, often the other side starts up.

The most dangerous complication of mumps is secondary infection of the sex glands, especially in the male; sterility sometimes being caused by complications of this sort when they are unwisely treated. It is to prevent complications of this sort that children who are not very ill with mumps should be kept in bed until they are well over the disease.

CHICKENPOX

We seldom meet with chickenpox in those over ten years of age, though it can appear at any time of life. It seems that if we do not have it when we are under ten, we are not likely to get it later. It is the mildest and least important of all of the eruptive fevers of childhood. Its only complication seems to be in certain cases the kidneys, and in others, a tendency to erysipelas. Its period of incubation is fourteen to sixteen days.

The disease is manifested by a slight rise in temperature, headache, nausea, and sometimes chilly sensation, with loss of appetite. The rash appears about the time the fever does; in some cases even ahead of the fever. It appears on the face, head and trunk and resembles small watery blisters surrounded by reddened areas.

The eruption or blisters in chickenpox seems to come in crops, so that while some are drying up, new ones are appearing.

The most important thing about chickenpox is that the children should be prevented from scratching, as scars may result much as is the case in smallpox. The child's hands should be kept clean and the nails trimmed short, or they should, in the case of younger children, wear muslin mittens which can be frequently washed.

Chickenpox cases should be isolated until the patient is thoroughly recovered; until the skin is normal and clear.

CHAPTER XLI

INSECT-BORNE DISEASES

In recent times sanitarians have come to recognize a whole group of so-called contagious diseases which are largely, and in some cases exclusively, transmitted by insects. The discovery of this fact has led to the practical subjugation of many diseases which, in the past, have attained the terrible dignity of world plagues—veritable scourges of the human race. And there is no doubt but that further adherence to the principles of prevention which have been developed as the result of these momentous discoveries will result ere long in practically stamping out several of these disorders.

MALARIA

In olden times it was believed that malaria was contracted from the miasma which had its origin in swamps and bogs and more recently, since we have come to know that mosquitoes spread this disease, we can readily understand how in former times the origin of this malady became associated with swamps.

It is interesting to know that only one variety of mosquito is able to transmit malaria. This insect bites a person who has the disease and then after a period of time it becomes infective if it bites another susceptible human being. This particular mosquito is called *anopheles,* and at the height of the season in malarious districts, 25 per cent of the insects are infective.

Symptoms. The attack begins with a chill, violent aching, severe headache and fever which lasts anywhere from one to several hours, and the whole paroxysm ends with sweating. These attacks may be repeated every forty-eight or seventy-two hours. Examination of the blood after it has been properly prepared will usually serve to disclose malarial parasites.

The malarial parasite. The parasite of malaria gets into the blood cell where it grows and develops and soon divides

into a dozen new ones, and this multiplication of the parasites is announced by the presence of a chill. At first these parasites multiply without producing chills but when their numbers have reached large proportions then the process of multiplication precipitates the chill. There must be over a million in order to bring on the chill. When the number drops down to about a million, the chills cease, the patient merely suffers from a general good-for-nothing feeling, yet at any time the proper brand of mosquito bites him, the insect will, if it got some of the parasites in its blood-meal, within ten days become infective if it bites another person.

It is these chronic cases of malaria that make it so difficult to stamp out the disease; these half cured cases, but not cured sufficiently to prevent mosquito infection.

The malaria patient is not infective for mosquitoes until about two weeks after the first attack of chills and fever, until the sexual forms of the parasite are produced. This suggests that a prompt administration of quinin would result in controlling the disorder before the malaria victims become infective to mosquitoes—that is, there is two weeks in which to get the upper hand of the parasite.

It requires about ten days for the malarial parasite in the mother mosquito to develop and it is highly probable that not one mosquito in ten lives this length of time. If it does and can live on a few days more, it is ripe to transmit the disease to any individual it may chance to bite.

The remedy. The remedy is to give enough quinin, and to continue to take it long enough, to cure the disease. In mild cases 30 grains a day for one week and then 20 grains a day for a month; then arsenic and iron for three or four months, will usually do the business. It is not enough to take quinin just long enough to stop the chills. Within a month or six weeks the chills will return. In the meantime such persons are infective to the mosquitoes that bite them.

We must not only fight the mosquito but we must fight the malarial parasite in the blood of the infected individual.

In Italy they fought the mosquito and reduced the malaria rate from 70 to 16; then they went in for a thoroughgoing quinin treatment and reduced it from 16 to 4.

Malaria parasites will not develop in the body of the mosquito when the temperature is below 65° F. Therefore, between the arrival of autumn and the return of warm weather

the following spring, the malaria question is really limited to the people who have the disease, and if, during a single winter we could stamp it out by thorough quinin medication, it is evident that in the following spring it would be of little consequence whether we had many or few mosquitoes—many or few frog ponds—malaria would be through.

Prevention. Not only should the house be screened but the bed should also be protected with a special netting. Porches and verandas should be screened or else human beings should keep off of them after sun-down.

The use of quinin daily the year around by the residents in the Panama Canal Zone shows that 2 grains can be taken three times a day, at each meal, and that it seems to do little or no harm.

Since mosquitoes are not able to travel against the wind, in localities where the wind blows usually in one direction, the community can fight malaria successfully by concentrating its efforts on the marsh lands which lie to the windward.

When autumn arrives and the average temperature is below 65° F. much of the time, the mosquito is out of commission. This affords an excellent opportunity to clean up the malarial situation before the next spring.

Bass says: "All that is required for the complete eradication of malaria is for everybody who had malaria during a warm season to take the proper amount of quinin on each of two consecutive days in each of six consecutive weeks during the following cool season."

Suppose every person who had an attack of malaria last summer would begin in the middle of November and take twenty grains of quinin a day each Saturday and Sunday until the first of January. If Bass is right—and Bass knows malaria as well as anybody in the world—there would be no malaria next spring and summer.

The mosquito. We should all be glad to know that most of the mosquitoes which sally forth in broad daylight to sing and bite—those little fellows which make such a nuisance of themselves and produce the itching hives as the result of their sting, and which so often result in blood poisoning because of scratching the bite with dirty finger nails—I say, while these insects make us no end of trouble, they do not transmit either malaria or yellow fever. Fortunate indeed it is that the mischief-making mosquitoes, those that spread serious disease,

are a timid bunch. The yellow fever mosquito is never bold. The malarial fever insect is timid in daylight, but adventurous and bold after dark.

If a mosquito bites us in the daytime there is probably more than an even chance that the insect does not belong to the anopheles variety. If we are bitten at night, the chances are fifty to one that we have been bitten by the malaria spreading variety.

The campaign for controlling malaria demands that we take every precaution to prevent mosquitoes from biting sick people and also to prevent infected mosquitoes from biting well people.

Malaria victims must stay behind mosquito screens during the night time and the screening must be 18 or better, 20 meshes, to the inch and perfect throughout. Screens are of little use if they are poorly fitting and experts on this subject say that ordinary carpenters are not able to put in a screen so as to make the openings mosquito proof.

Controlling mosquitoes. One thing is certain—we cannot suppress malaria unless we control mosquitoes. That is, provided the mosquitoes become infective. We have the malaria spreading mosquitoes all around Illinois and Indiana, but the mosquitoes are not infected at present, and this goes to prove that it is easier to suppress malaria, so to speak, than it is to rout the mosquito. The mosquito preventing program embraces the following items:

1. The drainage of swampy districts, particularly tile drainage in preference to ditch drainage.

2. Keep barrels, buckets, cans, and other things which would accumulate small puddles of water, empty; drain small stagnant pools and puddles.

3. Screen all tanks and water barrels with No. 18 mesh screening.

4. Bodies of water which can neither be oiled nor treated with larvacide can be kept free of mosquito larvae by stocking with fish. Native minnows are best.

5. Proper pitching of ditches so as to prevent scum. Clean and slope the banks.

6. The cutting of brush and grass around ditches and within 300 to 400 yards of human dwellings.

7. The spraying of oil on ponds and breeding places which cannot be otherwise eradicated—once a week in warm weather,

every two weeks when it is cooler. Oil after hard rains and heavy winds.

8. Treating all water which has a green scum with sulphate of copper in the proportion of not over one grain to a million of water.

9. Encouraging the multiplication of mosquito killers, such as the dragon fly, snake doctor, bats, bull bats, and birds.

10. The encouragement of the breeding of fish which will live on the wiggle tails, such as minnows, shiners, and gold fish.

Facts about mosquitoes. 1. Mosquitoes rarely make their way across open ground for a distance of more than 100 yards. Therefore, if mosquitoes do not breed within 300 feet of a house they rarely cause great discomfort therein.

2. Female mosquitoes, the biters, live for a month or two. They work their way through the woods and dense grass. They hide under heavy cover.

3. To keep pools free from wigglers, sprinkle with oil about once every two weeks in hot weather. Use a mixture of four parts of heavy crude oil and one part light. The oil on the surface must remain unbroken. A spray is the best method of applying. A sprinkling can will do. If there is a fountain or pool in the yard, keep goldfish or minnows in it.

4. Various medicines recommended as mosquito repellents are of little service against this malaria spreading tribe of insects. When the hands and the face are covered with oil of citronella, one ounce, in liquid vaseline, four ounces, the insects will be kept away for awhile, but this sort of treatment will not last throughout the night.

5. To prevent mosquitoes from biting, Howard recommends:

Oil of citronella	1 ounce
Spirits of camphor	1 ounce
Oil of cedar	½ ounce

YELLOW FEVER

Yellow fever is all but a memory. Most of the doctors living to-day never saw a real case of the disease. Yet but a few years ago think what terror this dread disease struck to the whole southern part of this country. It has almost been driven off the face of the earth and only maintains a feeble hold in certain localities in South America.

Like malaria it is spread by a mosquito bite. About five days after the infective bite, the disease comes on dead in earnest; nothing like the gradual onset of typhoid fever. Fever is highest at the start; there are chills, aching, rapid pulse, with jaundice, which latter symptom originally gave the disease its name. After about three days of this, there occurs a remission, which is speedily followed by the stage of collapse, shock and black vomiting.

If the little hold which this disease still has in South America can be shaken, we stand to see the disorder eradicated for all time.

In 1919, Noguchi discovered the probable microbe of yellow fever, and since then a vaccine and serum have been made, but it is too early to know whether these are effective or not.

The mosquitoes causing yellow fever are not active from 9 A.M. to 3 P.M. except in dark places, or in darkened forests.

The conquest of yellow fever. As early as 1881 Dr. Carlos Finlay of Havana had suggested that yellow fever was due to mosquito bites, and the work of Dr. Ross in India had proved that malaria was caused only by the bites of mosquitoes. These facts and theories stimulated an American Commission to experiment with yellow fever. This body was made up of the following United States Army surgeons—Drs. Reed, Carroll, Lazear and Agramonte. The experiments were done at Camp Lazear in Cuba, in a frame house with a screened vestibule, and so constructed as to shut out sunlight and fresh air. Previous to this time, in September, Dr. Lazear had permitted himself to be bitten by a mosquito in a yellow fever ward and he sickened in five days and died a week later of the disease. Two months later fifteen mosquitoes which had bitten yellow fever patients were allowed to bite one of the volunteers at Camp Lazear, and he became ill with the disease five days later, while two other susceptible persons slept in the same room for eighteen nights separated only by a mosquito screen partition from the patient. These latter remained perfectly well. Many other volunteers knowingly permitted themselves to be bitten by mosquitoes (which had bitten yellow fever patients a sufficient time previously) and they all took the disease. To prove that there was no danger of contagion from the clothes or discharges of yellow fever patients, two soldiers and a surgeon slept for twenty-one consecutive nights in a mosquito-screened house in which were

boxes containing clothing of yellow fever patients soiled with their blood, urine and bowel discharges. Each night the men handled these by unpacking them and hanging them on a line in the room, and each morning they packed them up again in the box. Moreover, two other soldiers slept twenty-one days in the night-clothes and sheets just as they had been taken from patients recently dying from yellow fever, and one of these men actually slept on a towel soiled with the blood of a yellow fever patient. None of these volunteers took the disease. The outcome of all these experiments proved:

1. That yellow fever was only transmitted by the bites of a certain species of mosquito.

2. That the mosquito is harmless for a period of eight to twelve days or longer after biting a yellow fever patient, but that then the mosquito is dangerous to man as long as it lives, in one case fifty-seven days following the biting of a patient.

3. That a period of two to six days after a person is bitten by a mosquito, which has previously bitten a yellow fever patient, must elapse before the patient begins to sicken.

4. That the injection into a susceptible person of even two drops of blood taken from a yellow fever patient in the first three days of his sickness will produce the disease in one who has not previously had it.

5. That the mosquito to be dangerous must bite a patient during the first three days of his sickness.

6. That there is no danger from contact with a patient, his clothing or discharges, but only from mosquitoes which have bitten patients.

As a result of this knowledge, that hotbed of infection, Havana, which had been a pest-hole of yellow fever for 130 years, was cleared of the disease by Gen. Gorgas in 1901, by interfering with the breeding of mosquitoes, by destroying mosquitoes which had bitten yellow fever patients, and by preventing mosquitoes from biting patients. So, again, in Panama Gen. Gorgas stamped out the disease absolutely within sixteen months of the American occupation in 1904, with no return since; and upon this result did the success of the canal construction largely depend.

BUBONIC PLAGUE

This disease seems to be at home in China, and from its Oriental habitat, goes forth now and then to scourge the

world. Sometimes, in past centuries, it took off almost half of the population in certain regions which it afflicted.

The plague had insidiously spread itself, until by the beginning of the present century, it had gotten hold here and there throughout the whole civilized world. It was about this time that its presence was detected in California and other points on the Pacific Coast and occasioned a reaction on the part of health authorities which soon resulted in its being brought under complete control.

In the fourteenth century plague destroyed one-fourth of all the people of Europe. It was then known as the *black death.*

Bubonic plague was originally brought to this country by rats on shipboard from the Orient, and now it has taken root in South America and Cuba and we are exposed to infection from these new localities.

Symptoms. The three kinds of plague are bubonic, septicemic and pneumonic. In the bubonic type the lymph glands, and particularly those in the groin, filter the bacteria out of the lymph, keeping most of them from getting into the blood. In the septicemic form the bacteria get right into the blood stream and the groin glands, not being choked with them, do not swell up; in other words, do not make these characteristic buboes.

In the pneumonic form the bacteria are carried into the lungs by the air and cause pneumonia.

In a given epidemic the type of the disease is either pneumonic or bubonic, the septicemic cases being modifications of the bubonic type.

The bubonic form starts with a chill, followed by a fever, which may go as high as 108° F. About this time the glands begin to swell. Generally the swelling is limited to one group of glands. This group is the one which serves as a filter for that part of the body through which the infection entered. There is nausea, vomiting, aching and profound prostration. Later there is stupor, delirium and unconsciousness. The glands may break down, may suppurate. There may be hemorrhage from the nose or from any mucous membrane. There may be small hemorrhages under the skin.

The pnuemonic type of the disease is characterized by a sudden and fatal form of lung inflammation not wholly unlike

the form of pneumonia or edema which accompanied the last epidemic of influenza in this country. The diagnosis is made by drawing off some fluid from an infected gland, the examination of which discloses the plague bacillus.

Prevention. The modern method for fighting the plague is to rat-proof everything connected with human dwellings, to make life impossible for rats through starvation.

The plague is kept alive and spread by rats and ground squirrels, and in this way probably smolders for decades, even when it is not apparently present in human beings.

The flea is the intermediary in bubonic plague. He is the insect that completes the cycle. Fleas carry the bacillus of the plague back and forth between rats and men by sucking the bacillus into their stomachs. The plague bacillus will live for two weeks in the stomach of a flea.

We must also remember that rats spread trichina and tape worm.

A vaccine has been more recently perfected designed to protect one against plague and is thought to afford something like 80 per cent protection, and even if it fails to work it certainly lessens the severity of the disease. This vaccination is probably effective from six months to a year.

The cost of rats. The total cost per inhabitant for city people is $1.27 per year per rat. In other words, Chicago's rat bill is something over $3,000,000 a year; that of the United States, $35,000,000.

In rat killing, Doctor Evans places traps first, poisons second, dogs third, skunks fourth, and cats a bad fifth. An alley cat in a city is worth while, but a kitchen fed cat is useless. While rat-catching dogs, rat traps, rat poisons, covered garbage cans, and other anti-rat procedure help a little, no plan of rat eradication makes much headway except rat-proofing. Rat-proofing means cement construction. A man who will rat-proof his buildings and then keep a few rat dogs around will not be greatly annoyed by rats.

Lantz estimates that it costs $1 a year to keep a rat in a city. A farmer can keep one for about 60 cents. The farmers within 500 miles of Chicago keep about one rat to each acre. These figures give the cost for plain feeding. Fancy-fed rats are more expensive. A silk-eating, or picture-chewing, or a shoe-cutting rat costs more to maintain.

ROCKY MOUNTAIN FEVER

This disease, which is found in the Rocky Mountain region extending over to the Pacific Coast, is also known as Rocky Mountain spotted fever. The disease is not widespread and it is often known locally as "tick fever." The disease is spread by wood ticks which live on gophers, squirrels and coyotes.

The Federal Government has worked on the theory that if sheep are grazed over a district they will gather up all the ticks. It seems that a tick will leave any animal to get a sheep berth. In the sheep's wool almost 90 per cent will die. The remainder are got rid of by taking the sheep up on the mountain side to graze. In this way, by the time the female ticks are fully grown and ready to reproduce, the sheep are above the range of the gophers, chipmunks and squirrels, so that as the females drop off they lay their eggs and perish. The young hatch out but have no animals on which to live. This is probably the reason why there is no tick fever on the east side of Bitterroot Valley, because years ago 40,000 sheep were grazed on this side of the slope.

This disorder seems to be an American disease, as it is not found outside of this country.

TYPHUS FEVER AND DENGUE

Typhus fever until recent times has been a disease that has followed in the wake of war, siege and famine.

In the World War, the delousing régime was an efficient preventer of typhus fever. In a way, typhus was a sanitary disease, and cleaning up, good sanitation, has just about eradicated the plague.

Lice are suspected of transmitting typhus fever and also relapsing fever and other infections.

Bedbugs have been suspected in case of relapsing fever, tuberculosis, leprosy and Kala-azar.

Fleas act as an intermediary host for tape worms and are also thought to be the means of spreading typhus fever.

Dengue fever. This is a disease transmitted from one human being to another by means of the yellow fever mosquito. It is a summer disorder. The disease is characterized with high fever, chilliness, excruciating pains in the head, back and joints. After three or four days the fever disappears for a few days, only to reappear for a short time. With the second

outbreak of fever, a bright red rash appears first on the hands and rapidly spreads over the body.

The disease in general is prevented by avoiding contact with infected mosquitoes, much as we would combat yellow fever.

TABLE OF INSECT-BORNE DISEASES

The Disease	The Real Cause	The Insect
	Mosquitoes	
Malaria	Plasmodium of malaria	Anopheles
Yellow fever	A filterable virus	Stegomyia
Filariasis	Filaria Bancrofti	Culex and Anopheles
Dengue	A filterable virus	Culex
Bilharziosis	Schistosoma Hematobium	Anopheles
	Flies	
Nagana	A Trypanosome	Tsetse fly
Sleeping sickness	A Trypanosome	Tsetse fly
Pappataci fever		A biting gnat
"Pink eye"		A midge fly
Egyptian Ophthalmia		Flies
Infantile paralysis	A filterable virus	The stable fly
Typhoid, cholera, and dystentery	Various microbes	All kinds of flies
	Ticks	
Texas fever	Babesia Bigemina	A tick
Rocky Mountain fever		A tick
Relapsing fever	A Spirochete	A tick
	Bedbugs	
Relapsing fever	A Spirochete	Bedbugs, fleas, and lice
Kala-azar	A Trypanosome	Bedbugs
	Fleas	
Plague	Bacillus Pestis	Fleas
	Lice	
Typhus fever		Lice

CHAPTER XLII

FILTH DISEASES AND FLIES

The house fly ought to be called the "typhoid fly" but for the serious fact that it is also the means of carrying and communicating almost a dozen other forms of disease.

Flies are, in every sense of the word, filthy insects. They eat and drink in every known place of filth and disease from the cesspit to the vault. They devour the tuberculosis sputum by the wayside and hold their banquets in the garbage heap. On the soiled diapers about the nursery, or discharging wounds, flies will swarm, and then carry these germs of infection throughout the neighborhood.

When a fly falls in a pitcher of milk or is found in other food, it may be quite easy to fish out the dead or dying insect, but remember that you are unable to fish out the million of deadly disease germs which the fly washed off his feet in the milk or wiped off on the food.

The only safe course is to screen the house thoroughly and early; carefully protect all food; go to work in earnest to destroy the fly's breeding grounds; have the garbage can covered; have the garbage daily or frequently removed; keep the garbage cans clean—either scald with hot water or add a little chloride of lime twice a week; have manure heaps promptly removed or kept covered in tight boxes or pits, so securely that flies cannot gain access to them; destroy or remove all other heaps of rubbish and garbage; for if all filth can be removed, flies will be robbed of their breeding grounds.

FIGHTING FLIES

Flies which have feasted upon tuberculosis sputum have been found to deposit 3,000 tubercle germs with each fly speck, and every fly is estimated to make about 25 specks a day. Thousands of people who are horrified on discovering a bedbug in the house, are indifferent to flies as they swarm about the food throughout the kitchen, crawl over the face

and lips of the sleeping baby, and expose the entire family to contraction of any contagious disease that may be within half a mile of their dwelling place. It is time that we awaken to the fact that mosquito bars and screens are cheaper than doctor's bills and funerals.

Of the insects invading the house, over 95 per cent are the "ordinary house fly"; the remaining 5 per cent include the stable fly, the flies which bite just before the showers, the blue-bottle or blow flies, which commonly lay their eggs on fresh or decaying meat; together with the small window or fruit flies. These small flies are not small house flies—they are another species.

Many house flies live all winter in some crack in the wall or in some other sheltered place, in a sort of benumbed state, until the warm spring days, when they are discovered buzzing about the windows.

It requires only about twelve days for a full grown fly to develop from the egg. The female fly is estimated by various authorities to lay from 100 to 1,000 eggs during the season.

Let us suppose that each female lays only 100 eggs and that one-half her offspring are females. This would give us 50 adult egg laying females at the end of the first generation or in twelve days from the time the eggs were laid by the first female fly. At this same rate, by the eighth generation or near the season's close, there would spring from this one original female fly, billions of adult flies; but even if we should allow for the destruction and death of a very large part of the females all along during the season, we would still have a prodigious number of offspring produced by a single fly in a single season; and these estimates do not include an equal number of male flies, which are just as active as the females in spreading disease.

Manure has been found to contain as high as 2,400,000 developing flies to the ton.

How to kill flies. Flies are more easily prevented than killed. Their breeding grounds are very easily removed; and they are easily destroyed in the form of maggots, for all flies are maggots before they are flies. If through carelessness or faulty screening, flies do gain access to the house, they may be destroyed in the following ways:

1. Fly traps of various designs are on the market, many of which are very effective in entrapping these insects.

2. Sticky fly paper. This means will be found quite effective in helping to eradicate the pest in the house that has been tardily screened.

3. Fly poisons. The following will be found useful in killing flies. Place two teaspoonfuls of ordinary formaldehyde in a pint of slightly sweetened water and put in a shallow dish where the flies are thickest.

But most of these fly poisons are equally poisonous to the baby and the children about the house. The following fly poison will be found useful in killing flies, but will not kill the baby:

Bichromate of potash....................2 drams
Dissolve in water........................3 or 4 ounces
Sweeten with plenty of sugar.
Expose to the flies in a plate or other shallow dish.

How to prevent flies. After all, the safest and sanest method of fighting flies is to labor for their prevention, and this is brought about by general cleanliness. Keep the house and premises sweet and clean. Specific suggestions may be made as follows:

1. Sprinkle chloride of lime over privy vaults, manure piles and other piles of refuse, if they cannot be immediately burned or removed.

2. Keep garbage cans tightly covered; empty and clean daily, or at least three times a week.

3. Keep manure in closed boxes or covered pits. Remove no less than twice a week.

4. Pour kerosene into any suspected drains or sinks.

5. Keep the house and yard absolutely clean. Admit fresh air and sunshine.

TYPHOID FEVER

Typhoid fever is a preventable disease in a double sense. Not only can it be prevented by avoiding the filth that produces it and the flies that carry it, but it can be avoided by antityphoid vaccination.

The typhoid bug in many ways resembles the colon germ that lives in the intestines of many animals, but the typhoid germ lives only in the intestines of man. Following an attack it sometimes infests the gall-bladder where it remains indefinitely, and such an individual then becomes what is known as

a "typhoid carrier." So far as we know man is the only animal that can pollute the water and contribute to its spread. In general, the microbe will live a month or less outside of the human body.

While we have only one-half as much typhoid in this country as we did twenty-five years ago, yet we have five times more than they have in progressive European countries.

Typhoid has been sometimes more fatal among soldiers than bullets. In the Boer War only 7,000 died of wounds, but over 8,000 perished through typhoid. In the Spanish-American War, 243 American soldiers died of wounds, and 1,580 of typhoid.

How spread. Typhoid is spread from infected persons to the innocent by food, fingers and flies.

The present battle against typhoid is largely that of a village and rural campaign. The country folks must come to appreciate that typhoid is spread from one human being to another through the channels of food and with the assistance of flies. Typhoid is not a contagious disease, that is, you cannot get it from being in the room with the patient. You must in some way get the germs as they come from the patient's body and you must get them into your digestive system. We have to eat or drink our typhoid infection. The chief sources of infection are water and milk. The Chinese never drink raw milk or unboiled water and they rarely have typhoid.

We must not overlook the danger of raw vegetables and raw oysters as typhoid carriers.

The principal reason for warning against raw oysters and clams is that so many of the beds are not properly supervised and so many of the oysters are being floated or fattened in foul water. Until oyster beds are better supervised and more information is available as to which are right and which are not, oysters and clams should be cooked before being eaten.

No person should handle food who has recently had typhoid fever or who is a typhoid carrier. Washing the hands before handling food and before eating is not a fad. It is the best of common sense and prudence. Nobody should ever eat without washing the hands.

Flies can carry typhoid bacilli to the sugar, the bread, the butter, or any other article of food. The flies in a house may not have typhoid on them, but the person eating has no way

of knowing, therefore the only safe policy is to keep flies away from the food.

Symptoms. The disease comes on slowly with a tired feeling and some aching. There is usually constipation. Within twenty-four hours the patient feels feverish. The temperature probably is a little above 100° F. For a few days the symptoms increase in severity. If the blood is taken at this time and cultured, the bacillus will be found. By the end of the first week, a drop of blood will probably show the Widal test, a test which is diagnostic of typhoid fever.

During the second week the fever gets higher and higher day by day; the patient sicker and weaker. During the third week the fever still remains up. Sometimes the intestinal ulcers result in diarrhea, but not always. During the fourth week the fever gradually recedes and by its end, the temperature is normal. And it is during this fourth week that complications are most likely to occur—complications that kill more people than the typhoid itself. They are pneumonia, inflammation of the veins, and perforation of the bowel, followed by hemorrhage or peritonitis.

Owing to good nursing and better care we seldom see typhoid of the severe, old-fashioned type of a generation ago.

Some people have typhoid very lightly and continue to meander around while the disease is in progress, spreading infection right and left. This mild form of the disease is called "walking typhoid."

The incubation period for typhoid fever is about ten days.

Prevention. Typhoid can be prevented by refusing to eat raw food or drink raw water, and never eating with unwashed hands. But we can also fight typhoid by avoiding the contamination of our food and water. We fight typhoid by bringing about pure milk and water supplies, by curing up our typhoid patients and our typhoid carriers; by combating flies which spread the disease, and last but not least, by typhoid vaccination.

We must remember that the secretion of both the bowels and the kidneys are teeming with bacteria, and that is the way the disease is spread, and this elimination of microbes may continue for weeks or months after the patient has apparently recovered from the typhoid attack. Sometimes it persists for years or a lifetime. In many of these cases, the mother colony for the bacteria is in the gall-bladder.

In considering foods three questions should be asked:

1. Is the food to be eaten raw?

2. If it is cooked, is it handled after cooking by anyone who has recently had typhoid or been around typhoid?

3. Have flies got on it after cooking?

Articles to be watched are fruits, cabbage, lettuce, tomatoes, celery, radishes, onions, watercress, cucumbers, raw oysters and clams.

To begin with, no one should buy vegetables or fruit from a store, stand or wagon, where things are not clean. Articles of food exposed where dust, flies, dogs and cats can get at them should cause customers to buy elsewhere.

However clean fruits and vegetables may look, before they are eaten raw they should always be washed in clean water. Celery should be split up so that each leaf can be washed.

Typhoid vaccination. Health departments should do more to broadcast information and otherwise popularize typhoid vaccination so that the public would understand that there is a vaccination for typhoid and that it is effective.

At present it is not known for how long a time typhoid vaccination protects—probably for several years. Certainly in the majority of cases for more than one year. The United States Army requires typhoid vaccination at the time of enlistment and again in three years. It is believed that these two vaccinations protect an individual for life.

Physicians of the United States Public Health Service believe that typhoid vaccination will prevent infection in 75 per cent; but there is a residue that will not be protected in case they expose themselves to overwhelming infection.

The United States soldiers sent to the Mexican frontier in the spring of 1911 were vaccinated against typhoid. Colonel Kean compares the 12,000 troops stationed at San Antonio with 10,000 stationed at Jacksonville, Florida, during the Cuban War in 1898. In the Jacksonville troops there were 2,693 cases of typhoid fever, with 248 deaths. In the San Antonio troops there was one case of typhoid and no deaths.

DYSENTERY

Dysentery is another of the filth diseases, belonging to the typhoid group. It is produced by a definite microbe, though many other germs are able to produce diarrheal infections and dysentery-like attacks. The disease is often secured from

drinking contaminated well water and it is one of the great destroyers of life in tropic climes. It is also greatly feared in military camps and is in some of its various forms, the great bugaboo of children during the summer season.

We make a mistake in calling all severe diarrheas, dysentery. This probably grows out of the fact that dysentery always begins with frequent and loose bowel movement, but dysentery also is attended with fever, great weakness, more or less pain in the bowels, and is a definite disease. The evacuation of the bowel is painful and there is both mucus and blood in the stool.

Dysentery and the summer diarrheas are not only spread by means of polluted water, but also by infected milk and as has already been intimated, flies are the most efficient agencies in the dissemination of the disease. We should also remember that we have "dysentery carriers," just as we have "typhoid carriers." That is, persons who, though not suffering from the disease, harbor the germs in their bowels, thus diffusing the infection in wide-spread fashion, to be still further transmitted by flies.

The more recent dysentery vaccine should be used in cases of epidemics, and is of great value. Its value as a protective agency extends only over a period of eight to ten weeks.

Amebic dysentery. In the Philippines and other countries of the Orient, and to a certain extent even in the southern part of the United States, there occurs a more serious form of dysentery caused not by microbes, but by little animals, a species of ameba. This is the form of dysentery that is apt to be chronic and is sometimes difficult to recognize. In fact, persons cripple along with the infection for years, not knowing what ails them, though the organism is readily seen when the bowel discharges are subjected to microscopic examination.

This form of dysentery is sometimes very difficult to cure and is attended by serious complications, such as abscess of the liver. These patients sometimes have freedom from attacks for a year or more, then the symptoms will recur.

This form of the disease is usually treated by subcutaneous injections of emetin, which is the active principle of ipecac. The injection of emetin for a dozen consecutive days will result in the cure of about 75 per cent of these cases. The remainder will require one or more additional courses of treatment. This form of the disease is chiefly carried by means of infected water.

ASIATIC CHOLERA

Cholera is spread by means of food and water, and, of course, flies can contribute to the spread of the contagion by transferring infection from human discharges to food supplies of various sorts. The disease is spread very much like dysentery and typhoid fever.

India seems to be the real home of Asiatic Cholera and European countries had little trouble with it until about one hundred years ago. Cholera is frequently brought from the Orient to European and American seaports, but it has never been able to gain a foothold in recent times because of modern methods of sanitation and control. These same methods are responsible for banishing the disease from the Philippines subsequent to American occupation.

The same régime of strict personal cleanliness, sickroom disinfection, and the control of flies, as noted in connection with typhoid fever, applies equally to the management and prevention of cholera.

An attack of cholera also seems to be favored by anything that irritates the bowel, upsets the digestion, or lowers the vital resistance of the individual.

The cholera vaccine is more or less successful and has been used with great advantage in countries where the disease is still prevalent. The Haffkine vaccine is made from killed cholera germs.

One of the reasons for holding vessels at our seaports in quarantine for five days is for the purpose of examining the bowel discharges of immigrants for cholera germs. Of course other investigations are also made during this period of quarantine.

INFANTILE PARALYSIS

Dr. Rosenau claimed that he gave infantile paralysis to monkeys by means of flies. One thing we know is that the virus of this disease is highly resistant; that is, it is hard to kill. In a sick person it is found in the nervous system, in the secretions of the nose, in some of the lymphatic glands, and sometimes in the blood. It may even be swallowed from the nose and throat, go through the stomach and bowel, and find its way into the lymphatic glands of the abdomen. The virus of this disease will also pass through the smallest pores of a filter,

and sometimes it will stand an exceeding amount of heat or sunlight, and it is very resistant even to chemical disinfectants.

The fly which Dr. Rosenau used in spreading the disease was the ordinary stable fly. This is a form of fly that does not eat ordinary food, and is very difficult to catch or poison.

Other authorities believe that there is great danger in connection with the milk supply when it comes to spreading infantile paralysis. Milk wagon drivers may well be the means of spreading this disease. When a large number of people are exposed to infantile paralysis, some of them take the disease; others go about apparently well, but spread the contagion promiscuously through their nose and mouth secretions; as when it once invades a person, even though that person may not come down with the disease, they are infectious for three or four months.

It is probable that the nose secretions of a child who has had this disease are infectious for many months. Some think for six months or more.

The disease is spread by contaminated fingers, linens, household utensils, food and flies, as well as by coughing and sneezing.

Symptoms. In children the disease usually manifests itself by dullness and disinclination to play, mild fever soon appears, there is pain throughout the body, and the child usually cries on being moved. Many have convulsions, with squinting of the eyes and retraction of the head. Vomiting is common. After two or three days of this sort of thing, the characteristic paralysis begins to appear, showing itself in one leg or arm, or both legs or arms. More often one leg is paralyzed. The general symptoms pass and the paralysis remains for two or three weeks, when, if not severe, it begins to improve; and if prompt treatment has not been administered, there will be more or less wasting of the muscles.

In many ways this disease resembles cerebrospinal meningitis. It occurs in epidemics, more often after very hot weather, in the latter part of the summer or early autumn, and like meningitis it appears sporadically—in isolated cases. Again the micro-organism causing the disease shows a peculiar affinity for the brain and spinal cord, and seems also to be present in the secretions of the nose and throat. In the matter of healthy carriers transmitting the disease, it also resembles meningitis,

and like meningitis, not all persons exposed will contract the disease.

It produces paralysis by affecting the blood vessels of the spinal cord, thus leading to degeneration of the nerves that control the muscles.

We should remember that this disease starts with a fever and not with a paralysis. The trouble is in the spinal cord, not in the muscles. The muscles waste away after the disease, not during it. This is why passive motion, manipulation and massage, if employed just as soon as the fever passes, will be of help in keeping the child's muscles from wasting away.

Many children have an abortive type of the disease; they have all the symptoms but not the paralysis, thus the disorder is never diagnosed and they are able to spread the infection right and left because no effort is made to isolate them.

Prevention. For some reason, infantile paralysis seems to be more prevalent in small towns and villages and even country neighborhoods. It very seldom invades the large cities.

One thing is certain, infantile paralysis should be quarantined as should all those who have come in contact with the child. No child from such a home should be allowed to attend school. Both the child and the contacts should be quarantined for at least four months after the appearance of the disease.

Every effort should be made in times of infantile paralysis epidemics to combat stable flies.

The secretions of the nose and throat should be carefully collected in these cases and burned. Bowel and urine discharges should be disinfected as in typhoid fever. The isolation should be stringent. Disinfection of everything which leaves the sick room must be thoroughgoing; there must be thorough screening of the patient's room.

The Flexner serum will probably be of benefit, though it seems to be most helpful in earlier stages of the disease, not after the paralysis has occurred. More recently Rosenau has perfected a horse serum.

The contagion of this disease has been greatly exaggerated. It is not believed to be one-fifteenth as contagious as scarlet fever.

None but the necessary attendants should be allowed in the patient's room. Allow no visitors in the house.

Other children in the family should stay at home; they

should not go to public places such as school, church, parks or theaters. This isolation must be maintained for not less than four weeks.

Flowers brought to the sick should not be thrown out, but placed in disinfecting fluid or burned.

The nose and mouth of the nurse or others who are compelled to come in contact with the patient should be thoroughly washed out before leaving the sickroom, using freely a 2 per cent solution of peroxide of hydrogen or some other efficient antiseptic.

Disinfect all dishes, utensils, bedding, towels, napkins, cloths, handkerchiefs, clothing, books, papers and remnants of food before removing them from the room. Sweep and clean room with a cloth wet in disinfecting solution. Do not use a broom unless frequently dipped in a disinfecting solution, and use while wet. Avoid dust in the sickroom. It is believed that dusty rooms, dusty houses, dusty streets, are important factors in spreading the disease. If vacuum cleaner is used—burn dust collected and disinfect cleaner.

The paralysis. There are probably over 250,000 crippled children in the United States at the present time as the result of infantile paralysis, and there are many forms of exercise which can help these patients which the physician can teach mothers, but which it is not in place in a work of this kind to describe in detail.

It has been ascertained in England that twenty-five per cent of crippled children are due to the results of infantile paralysis.

Mothers who have these children should know that if much time has passed, very little can be done for them, and further, they should understand that the milder forms of deformity will pass away with good feeding, good hygiene and out-door living. Some cases long neglected can be helped considerably by operation.

A common result in these cases which recover is the tendency of the child to walk on the heel with the toes drawn up, or to walk on the toes with the heel drawn up. These deformities can be remedied by operation.

HOOKWORM DISEASE

You can go into the most healthful mountain climes of the South and be confronted with the most amazing specimens of youth. So many of the children are pale, puny and anemic,

and mosey along as if half dead. What is the meaning of this lethargy and inertia on the part of the youth in the midst of apparently healthful surroundings? Competent authorities believe that more than 2,000,000 people are infected with hookworm in the Southern states. Hookworm and chronic malaria are the great curse of the South. It is believed that 90 per cent of Porto Ricans are infected with hookworm and 15 per cent of the Philippinos. In various places in the southern part of the United States, the young people are found infected in percentages varying all the way from 20 to 80.

The other name of the hookworm is Necator Americanus. The male is about one-fifth of an inch in length; the female about two-fifths of an inch. The larvae of this animal enters the body through the skin of the hands and feet. This is why going barefooted greatly predisposes to the infection. The parasite goes through the blood to the lungs, where it lodges, and from which place it is coughed up and as some of them are swallowed, they attach themselves to the first six feet of the small intestines, where they live as blood suckers. Their toxins spread throughout the body, not only lessening the coagulability of the blood, but otherwise poisoning the victim.

The females lay eggs which are carried out in the bowel discharges and thus the cycle of infection goes on. Four or five million hookworm eggs will be found in one bowel evacuation. The eggs are about 1/500 of an inch in diameter and can be readily detected by the microscope. They live best in warm, moist soil between 65° and 85° F., and are killed by dryness and sunlight.

In entering the body the worm produces irritation, especially between the toes, which is known as ground itch, and causes little blisters and pustules exudating a sticky discharge.

Symptoms. The patients are pale, anemic, greatly dwarfed in growth and apathetic. The eyes have a dull and fish-like stare. There may be loss of appetite and some discomfort in the region of the stomach with colic and diarrhea. The appetite may be so perverted that subjects eat earth, clay, hair, paper, starch and chalk. Persons infected with hookworm constituted the "clay eaters" of the South. The presence of the disease is confirmed by the finding of the eggs in the feces of the subject. The presence of blood in the feces is significant of hookworm. A simple test for blood is to place a bit of bowel discharge on a piece of white blotting paper and if a rusty

stain appears after an hour or so, it is evidence of blood in the feces. In severe cases patients may become bedridden with great weakness, pallor and swelling of the feet and other parts of the body.

Prevention. The real prevention of hookworm is to wear shoes and stockings throughout the infected regions. The disease may further be prevented by proper care of the bowel discharges from infected patients and in this way prevent the dispersion of the hookworm and its eggs. The people in infected regions must be educated regarding these matters and it is along this line that the Rockefeller Foundation is doing such extensive work at the present time throughout the South.

We must remember that the hookworm eggs may also be taken in contaminated water. The water should be boiled in infected regions. Care should be taken to wash the hands thoroughly before eating if you are in a hookworm country. The bowel discharges in outside toilets in hookworm districts should be covered with milk of lime, made by adding one part of freshly slaked lime to four parts of water.

More recently hookworm is being successfully treated by the use of carbon tetrachlorid. This substance is a very valuable remedy in hookworm and in the vast majority of cases the pest is eradicated by a single dose of the medicine.

THE SLEEPING SICKNESS

Sleeping sickness, known as a fatal disease occurring among the negroes of tropical West Africa, has been almost certainly shown to be transmitted by the tsetse fly. During slavery days in America and the West Indies, the sickness was occasionally imported to the Western Hemisphere by negroes sold into slavery, but it never spread to individuals born outside of Africa, the necessary intermediate host and distributor of the disease, the tsetse fly, being lacking. With the exploration and commercial opening up of the African continent, the disease wandered from its original area, extending along the Congo River and in other directions, so that to-day it is not only common throughout the Congo Free State, but threatens Egypt as well, having recently invaded the Nile Valley. In portions of the interior of Africa, notably the Victoria Nyanza Lake region, it was once epidemic to such an extent that the entire population of many villages was destroyed and the country, in areas, was practically depopulated.

CHAPTER XLIII

COMMON CONTAGIOUS DISEASES

In this chapter we will consider a group of contagious diseases which, while belonging to the class of germ-caused diseases, are not nearly so "catching" as many of the contagious maladies already discussed. These diseases are spread by flies, dog bites, wounds, animals and human contact.

CEREBROSPINAL MENINGITIS

This is a disease caused by a definite germ, the meningococcus, and it sometimes occurs in epidemics in this country. It is particularly severe when it occurs in the slums of our great cities and in military camps. The disease is not very highly contagious, often only one case appearing in a large family.

A few years back, Dr. Flexner injected a horse first with dead microbes and then with the living germs, and produced a serum which is very valuable in treating this disease.

Spinal meningitis is diagnosed, in case of doubt, by withdrawing fluid from the spinal canal in which the germs will be found. Owing to increased pressure in the canal, the withdrawal of the fluid itself sometimes greatly improves the symptoms.

Meningitis is a very fatal disease, death occurring in about 80 per cent of the cases untreated by serum, and the serum is not of so much value unless given during the first two or three days of the disease. The serum has cut the death-rate more than half in two.

There seems to be no real lasting immunity in meningitis as susceptible individuals have more than one attack.

Symptoms. Meningitis usually strikes suddenly, with headache, pains in the back and limbs, and with chills and vomiting. The onset of the disease is very much like a severe attack of influenza, but very soon its characteristic symptoms develop, which include stiffness and rigidity of the muscles of the neck

and back, drawing the head backward so that the body may be bowed up. The mind is often in a stupor and delirium is not uncommon. The eyes are sensitive to light, pupils are large, and in some cases a rash appears over the body.

Prevention. The germs of meningitis are not found outside the human body and they seem to die within a very few hours if exposed to drying or to light. Nine times out of ten the microbe can be found in the nose and throat of infected patients, and the disease is undoubtedly spread by means of droplet infection, and further by the fact that more than half of the healthy persons exposed to the disease become carriers of the infection, though they themselves never manifest any of its symptoms. In the disease, the organisms are not only found in the nose and throat but also in the bowel discharges or discharges from other parts of the body.

Thoroughgoing isolation should be practiced in cases of meningitis; the same methods should be carried out as practiced for the other contagious diseases, as regards the preparation of the room, disinfection, and nursing. It is probably well in this case also to use mouth washes, gargles, and nose sprays to assist in keeping the patient's respiratory passages as free as possible from infection.

Following the disease it is not necessary to disinfect the room. Sunlight and fresh air will do that. Health authorities nowadays, during epidemics of meningitis, recommend that all public gatherings be prohibited and that the schools be closed. Children in general should be isolated at such times. Avoid persons who have colds.

The meningitis vaccine should certainly be used both for purposes of treatment and as a preventive. While the treatment is in the experimental stage, yet sometime back in the Texas epidemic, 5,000 persons were thus inoculated, not one of which contracted the disease. Such a vaccine treatment probably affords protection for only a few weeks, but it should be resorted to in case of epidemics. There are other forms of vaccination which will afford longer protection, but it requires several weeks to carry out this latter régime.

It is surprising how nearly alike in many respects are cerebrospinal meningitis and infantile paralysis, though the diseases are caused by different microbes and are in many respects unlike in their final results.

The microbe of meningitis is very much like the pneumonia

germ. In fact, in some cases of meningitis it is found that the pneumonia germ is the cause of the disease.

There is a practical point that grows out of the little we know, and that is: when a person has meningitis or pneumonia or has recovered from either, the nose and throat secretions for months thereafter should be burned or boiled—otherwise the carrier may harm his family or friends.

HYDROPHOBIA

This disease which has long been associated with mad dogs, and which is also known as *rabies,* is an infection produced by a definite germ, and has nothing to do with lack of water or fear of water, as the popular name suggests. This name grows out of the fact that while the patient suffering from the disorder craves water, the effort to drink is so frequently followed by convulsions that there comes to be a dread of food or water.

Thanks to the Pasteur vaccination, hydophobia is becoming a comparatively rare disease in man.

Just as we have those who still oppose vaccination, now and then we find someone who raves at the idea of hydrophobia. Someone in Europe not long since published an article claiming that, "Hydrophobia is a disease which attacks man and impels him to kill dogs."

While the germ of the disease has not been isolated, the method of combating it by means of vaccine has been so well worked out by Pasteur that it is unnecessary that anyone in this country should be afflicted with, or perish from, this disease. The germ has an affinity for certain brain and nerve cells and it is from these that the successful vaccine has been made.

We should remember that a dog having rabies may transmit the infection not only by biting but by licking the hand of its master if there should be an abrasion on the hand.

The disease in dogs must sometimes be hereditary for young dogs which have been carefully raised in a laboratory and have not been bitten by other dogs, often develop this disease, while the infected mother may not manifest symptoms of rabies until some time after her offspring has shown it.

Symptoms in dogs. Dogs having the disorder show a modification of temperament. They are usually sullen or overly friendly or nervous, and they seem to have hallucinations.

That is, they seem to see imaginary objects and often snap at them. They sometimes shun the light and try to hide in some dark corner. Affected dogs vomit, have a frothy saliva which often drops from the jaws; they also have difficulty in swallowing and behave as if they had a bone lodged in the throat. After the onset of the disease the dog stays away from home, often traveling long distances, biting more animals, as well as snapping at other objects. The animal appears to be thoroughly sick, looks gaunt, the tail droops, there is a staring gaze out of its bloodshot eyes, and even the howl acquires a characteristic hoarseness. The last stage of the disease is characterized by paralysis and exhaustion of the hind legs, and lower jaw. The disease results in death usually by the tenth day. There is a form of the disorder sometimes known as "dumb rabies," or drop jaw, which very early shows this symptom of jaw paralysis, and is therefore not so often early recognized, as it is believed the dog has a bone in its throat.

What to do in case of dog bite. When a person is bitten by a suspected dog, the best thing to do is to cage the animal up for inspection and observation. If the dog is alive and in good health after fourteen days, we can be quite sure he did not have hydrophobia. In all cases of dog bite, if the animal cannot be kept under observation or if an examination is not made of certain brain cells, then it would be better to take the Pasteur treatment. Even if one's hand has merely been licked by a dog that subsequently has gone mad, it would be best to take the Pasteur treatment.

To confirm the diagnosis of rabies in dogs, two things are done. First a microscopic examination of the brain cells is made for the purpose of detecting the so-called Negri (named from their discoverer) bodies, which are diagnostic of this disease, and which are found in more than 95 per cent of infected dogs; and second, some of this matter is injected into the brain of a rabbit or guinea pig. Now if a dog really had rabies, the injected animal will die with paralysis of the hind legs usually within two or three weeks; though in some cases they may live as long as three months, but we cannot rely upon this as a means for determining whether or not to take the Pasteur treatment, for the human being would have long since developed the disease; and it requires about thirty-six days after the beginning of the treatment for the establishment of immunity.

While the prompt cauterization of dog bites lessens the liability of infection from rabies, it is not anything like a reliable preventive. In all suspicious cases the Pasteur régime should be followed out.

The period of incubation for rabies—that is, the time that will elapse from the dog bite to the appearance of the disease in man—ranges anywhere from two to twelve weeks. In the case of man the average time is probably about fifty days.

For cauterizing dog bites, fuming nitric acid or a hot iron may be used; following the use of acid the wound should be treated with soda solution, and then by alcohol. A valuable method also is to cut away tissue surrounding the bite. Such treatment of a dog bite is of more or less value up until twenty-four hours after the accident.

Bites are especially dangerous on the bare skin, or more particularly on the face. Ninety per cent of dog bites on the face from an infected animal produce hydrophobia, unless the Pasteur treatment is taken. There is some value in sucking dog bites if they occur on the hand or any other part of the body where such treatment can be applied.

The *Pasteur vaccination* is successful in preventing rabies in 99 per cent of those who take it. The vaccine is prepared from the spinal cord of rabbits which have been given the disease and whose cords have been dried varying periods of time, thus enabling the treatment to start with the solutions of the weakest cord first and then going on up to that containing more and more of the noxious virus. The treatment is given daily for three weeks.

There is very little danger in the treatment, as scarcely more than one person in a thousand ever develops any outward symptoms. In fact, one series of cases shows only one complication to every 2,177 persons treated. This is very little risk in view of the fact that only one person in 200 when treated ever develops hydrophobia, and that 30 untreated persons in 200 who have been bitten by mad dogs contract the disease.

It was the fear of hydrophobia, especially during the so-called dog days, that led to the enactment of the laws requiring these animals to be muzzled.

If the attack is genuine, death is always the result. No one is known to have recovered from hydrophobia. There occurs, however, many times a hysterical condition in persons who

have been bitten by a dog, which closely resembles genuine hydrophobia. These neurotic individuals feel sure they are going mad and they sometimes give a very wonderful exhibition of false rabies, but the attack only progresses about so far and then after the period of self-torture, they recover.

There is no such thing as dog days. January is attended with just as much danger from hydrophobia as is August.

Prevention. The Conference of State Health Officers has adopted the following as a standard plan to prevent hydrophobia:

1. Destruction of ownerless dogs. By an ownerless dog is meant a dog without a collar and license tag for the current year. This necessitates a dog-catching department and a pound. Dogs should not be sold from the pound.

2. A license fee for dogs. In cities the tag should be attached by the license officer who files a report describing the dog and its appearance as to health. The license system makes it easy to locate ownerless and straying dogs, reduces the number of dogs kept, and restricts the ownership of dogs to those who will give them care.

3. Legal responsibility. Owners should be made legally responsible for damage done by their dogs.

4. Public education. The care of dogs as well as the harm done people by infected dogs should be taught.

5. Muzzling. All dogs in the district should be muzzled for six months after each case of hydrophobia in a dog. This means that in country townships the dogs need not be muzzled all the time. In cities, as six months practically never lapses between cases, the dogs must be muzzled all the time. In either case the season has nothing to do with the case. It is not the history of the weather but the history of the mad dogs around about that determines whether dogs are to be muzzled or not.

6. Restraint of dogs. If there is much of the disease around the country, dogs must be kept at home for at least three months after the time of great danger.

7. Compulsory notification. Rabies in lower animals as well as in man should be reported. In the lower animals, in case the diagnosis is certain, the animal should be killed, the head sent to the proper laboratory and the case reported. If the case is suspicious the animal should be safely confined and developments awaited.

LOCKJAW

Tetanus, or lockjaw, as it is more commonly called, is a rare disease and is becoming more so in this country, owing to the success of the lockjaw antitoxin which has come to be so largely used following accidents and injuries.

The organism responsible for lockjaw naturally inhabits the intestines of horses, cattle and dogs, and is secured by man through dust, dirt, and other agencies contaminated with droppings from these animals. It is largely a disease coming from soil wounds, though occasionally it comes on without having been preceded by any known accident, injury or wound.

The spores of the tetanus germ are very difficult to destroy and they can exist for years in the soil. The germs of lockjaw do not grow when exposed to air and they therefore thrive best in wounds of a penetrating nature, such as those made by a sharp nail or from powder explosions which would force infection deeply into the skin. The disease is so fatal that in case of doubt the antitoxin should always be administered. We used to have a great deal more tetanus in this country before the campaign for a sane Fourth of July was inaugurated. The toy pistol was responsible for many cases in years gone by.

The disease will come on anywhere from a day up to three weeks following infection, the average period being about ten days. The longer the period between the infection and the appearance of the disease, the milder the attack is likely to be.

Symptoms. Tetanus begins with restlessness, irritability, outbursts of temper, violent headache, pain in the muscles of the neck and back and, after a few hours, there is stiffness of the jaws (lockjaw). This is soon followed by difficulty in swallowing, profuse sweating, a jumpiness at sudden noises. When the disease fully develops, all the muscles of the body are rigid all of the time. Convulsions come and go, but even between rigors the muscles are more or less in a state of spastic contraction. The contraction of the muscles around the mouth gives the disease its name, and the face its characteristic grin.

As a means of *preventing* lockjaw, or tetanus, antitoxin is practically invariably successful. It was used as a routine measure in the World War as soon as possible after all gunshot wounds in the American and British forces.

Tetanus antitoxin is made by injecting horses with gradu-

ally increasing doses of poison developed by the microbes of this disease and at the end of four or five months, their blood is withdrawn and from its serum the antitoxin is recovered.

The experiences of the World War have taught us several things about wounds:

1. Dirty wounds must be so dressed that they can get air.
2. Every man who has received a dirty wound should have a small dose of antitoxin—twenty to fifty units.
3. Certain horses are tetanus carriers. Attention should be concentrated on these carriers.
4. Tetanus is fairly curable. But before this information will be very helpful it is necessary that the people know the warnings of the disease.

ERYSIPELAS

Erysipelas is a disease of ancient and honorable standing. Hippocrates wrote about it, the disorder was known to all the ancients, and later on in the Christian era, erysipelas became one of the few diseases to acquire the name of a saint. It was for many centuries known as St. Anthony's fire. This probably came from the fact that the disease strikes so savagely, so spontaneously, and is sometimes so immediately fatal, that it had the earmarks of a divine visitation—a manifestation of the wrath of the deities.

Seventy-five years ago, erysipelas, blood poisoning, was one of the scourges of civilized peoples. To-day we hear little about it because the germ, streptococcus, has been discovered, and we know now that cleanliness and sunlight will serve very largely to prevent this dread disorder.

Just about everything in earth, sea and sky, has been at one time or another, blamed as the cause for erysipelas. It used to be a great source of trouble in the hospitals; in fact, it used to rather live in hospitals and institutions where large numbers of people were crowded together.

When at last it became known that erysipelas was spread by people and not by things, then epidemics of erysipelas became a thing of the past. The disease was robbed of much of its terror and to-day we only see it in isolated cases. Hospitals to-day are practically free from this scourge. The disease is so well managed to-day that even in hospital wards where it is cared for, it does not affect other wards or parts of the hospital. The appearance of erysipelas in a surgical ward

or in lying-in hospitals now would be looked upon as a consummate disgrace.

The most common site for the entrance of streptococcus germs into the body is the edge of the nostril and in wounds and fissures to be found on chapped hands. The disease is more likely to manifest itself in the winter, getting gradually worse until the months of March and April.

Instead of conferring immunity, it would seem that one attack of erysipelas predisposes to subsequent attacks. The disease spreads quite rapidly through the lymphatic system, and is very difficult to control when it once gains a foot-hold. The toxins are carried to all parts of the body, producing headache, general pains, fever, rapid pulse and sometimes delirium.

While the disease is sometimes fatal; nevertheless, recovery is usually quite complete. It does not have a tendency to affect the heart and kidneys permanently. The germs themselves are largely confined to the lymphatic system. When death occurs it is the result of the system being overwhelmed with the erysipelas toxins.

ANTHRAX

The anthrax germ was one of the first of all bacteria to be discovered and isolated. This is probably due to the fact that it is one of the larger of the known microbes. The disease is very common in horses and cows, but uncommon in man. More than half of the cases appearing in human beings start on the face, and a good proportion start on the hands or arms.

The disease starts out as a sort of carbuncle, behaving much like an insect bite. In fact, there is no way at first to tell the difference between anthrax and an ordinary carbuncle, except some of the contents be examined under the microscope. The majority of these cases of anthrax will get well. It occurs most commonly among hostlers, cattle tenders, butchers, tanners, wool sorters, rag pickers, etc.

There is a more serious form of internal anthrax which is more common in Europe than in this country. Anthrax of the lungs also sometimes appears among rag pickers and wool sorters; ordinary individuals are not subject to this disease except in case of the use of shaving brushes made from animals who have died of anthrax.

There is probably little or no danger of securing anthrax from wearing furs.

FOOT AND MOUTH DISEASE

Foot and mouth disease comes now and then into this country from Europe, but each time the Bureau of Animal Industry has succeeded in just about stamping the disorder out, even though at great expense and the killing of a large number of cows. The disease can be spread to human beings through milk. The disease is very often fatal in animals, but in human beings it is more mild. Pasteurization of milk is sufficient to destroy the undiscovered germ which is undoubtedly responsible for this disorder.

Symptoms. From three to ten days after exposure the infected person is attacked by a chill followed by general aching. The fever goes to about 102° F. There is vomiting and diarrhea. About three days after the beginning of the fever the mouth becomes inflamed.

The most frequent affection in the mouth is a crop of small, clear blisters. These appear on the inside of the lips and cheeks, on the gums and tongue. They seldom appear on the hard or soft palate. In most cases the crop of blisters is preceded by a fall in the fever. If the fever keeps up it is a sign that a second or even a third crop of blisters will follow, coming at intervals of three to four days.

There is not much danger of foot and mouth disease spreading among human beings. It is only perilous to those who handle and live in close contact with live stock, and then only in case the more recent invasion of this country is not stamped out, as it probably will be, by the continued supervision of the Federal authorities.

LEPROSY

From the study of the Bible, it would seem that the ancient Hebrews greatly feared leprosy. One thing is certain, the leprosy that we know to-day is not at all highly contagious.

Leprosy is a disappearing disease, and while there is some danger of contracting it—just enough to make it advisable to put lepers in colonies—yet it should be understood that the danger from casual contact is not very great.

Dr. McCoy, director of the leprosy investigation station in Hawaii, got the history of everybody connected with the leper colony or who had been connected with it for many years back. The Hawaiian law permits well people to accompany

lepers when they go to the colony and to remain with them as long as they wish and then return to society, provided a careful examination shows no leprosy.

Several hundred people whose histories were carefully investigated lived in the colony for months and some of them for years and then went back to society. Some are living with lepers as husband or wife; others live in the same rooms with lepers; others eat at the table with them. The contact is of the closest character and this intimate contact is kept up for years.

The results? One person in twenty-five developed the disease. Then the chance that a person living in a leper colony will escape infection is about twenty-four to one.

CHAPTER XLIV

SMALLPOX AND VACCINATION

In Minnesota they have no smallpox hospitals. They say—why should a peculiar minority impose upon the majority the unnecessary expense of maintaining these institutions when, if everyone is vaccinated, there will be no smallpox. The only countries that debate compulsory vaccination are the English speaking peoples. We can make the Philippines safe from smallpox but we can't make America, because of this noisy but clamorous minority of well-meaning but ignorant citizens who crave their liberty, not only the liberty to have smallpox, but also to jeopardize the entire community.

Smallpox is spread from one person to another. It is a question of personal contact. Although we do not know the exact germ that causes the disease, yet we know it must be a microbic malady. One of the interesting things about smallpox is that there are many light cases which are just as contagious as the more malignant form of the disease.

Symptoms. The smallpox attack begins on the twelfth day after exposure, with chills, high fever, headache and backache. In malarious districts it is often mistaken for chills and fever and quinin is administered. After three or four days these patients sometimes get up and go about the neighborhood until their attention is called to the fact that they are breaking out on the forehead. In the case of Mexican smallpox the eruption does not always appear on the forehead. It may appear on other parts of the body.

Smallpox is often confused with influenza at the time of the onset, as the early symptoms of the two diseases are very similar. Smallpox comes on with fever, headache, backache and vomiting, and sometimes these symptoms quite subside before the eruption appears on the fourth day, first on the forehead and face, then spreading from there to the front of the forearms.

The smallpox eruption appears first as a red spot, much like a flea bite, but it soon becomes hard and then little pimples,

feeling like they contain shot, appear on the third day; they are filled with fluid and become little blisters having depressed centers. Within three more days the blisters become pustular and great pains must be exercised to see that they are not scratched as they leave the well-known pock-mark if they are thus disturbed.

Prevention. Vaccination is the one and only preventive of smallpox. That is, it is the only one worthy of practical consideration. Of course, the patient should be isolated and all unvaccinated persons—those who are not known to be definitely immunized—should be denied access to him. The routine methods of disinfection and care of all that pertains to the spread of the contagion should be carried out. In the case of smallpox, it is believed that the contagion is spread by droplet infection—by means of the secretions of the nose, throat, and mouth, and that it is not carried through the air.

One thing is certain, if all of a single generation could be vaccinated, smallpox would disappear.

Cowpox. Cowpox is believed to be a modification or attenuated form of smallpox as the result of passing through the cow, and our whole scheme of vaccination is merely the process of taking advantage of this fact. Smallpox vaccination merely consists in giving the patient cowpox, which in turn confers immunity against smallpox. We get smallpox vaccine by inoculating calves with cowpox by making scratches on their bellies after the skin has been prepared and cleaned, and then on about the fifth day this eruption is scraped off and the infectious material is ground up and mixed with glycerin, and so treated as to kill all germs except those of cowpox. The calf is then killed and carefully examined to make certain that it was a healthy animal.

Successful vaccination will invariably protect an individual against smallpox after eight to ten days. Now as smallpox requires ten to twelve days to develop it is possible to avoid smallpox by vaccination any time within the first five or six days after exposure, and even if the vaccination is delayed until after eight days, we know that the smallpox will be much lighter, even when the vaccination fails to prevent it. After eight days following exposure, vaccination is useless in preventing smallpox.

Vaccination confers immunity to smallpox of varying length in different individuals, but it is safe to say that as a

general rule it protects against the disease for anywhere from five to seven years. The best plan is to vaccinate children early in life, say somewhere between six months and eighteen months, and then vaccinate them again when they are entering school, and a third time in about eight or ten years, and after that whenever there is danger from exposure.

Immunity test. Nowadays a test is made on the skin much after the fashion of the Schick test in diphtheria, to ascertain if a person is immune to smallpox. A drop of vaccine is rubbed into a single small scratch on the skin of the arm. If the person is immune a reddened area will surround the scratch within twenty-four hours, increasing perhaps a little up to forty-eight hours, and then rapidly disappearing. This is known as the "immunity reaction."

Smallpox could be stamped out if compulsory vaccination would be faithfully carried out by every state, city, and county. It may be interesting in this case to know that the United States Supreme Court has upheld the compulsory vaccination laws of this country.

The *dangers of vaccination* have been greatly exaggerated and someone has said that, "Compulsory school attendance is far more dangerous than compulsory vaccination." From 1905 to 1915 in 10,000,000 people vaccinated in the Philippine Islands, there was not a single death or serious complication of any sort. Most of the unfortunate complications attending vaccination are entirely avoidable. They are due to the failure to carry out the simple principles of clean surgical technique during the process of vaccination, or they result from carelessness in caring for the wound on the part of the patient subsequent to vaccination.

VACCINATION

Vaccination has always had its opponents notwithstanding its success in controlling smallpox. Even such a learned man as Herbert Spencer was misled into taking his stand against vaccination.

In 1774 Benjamin Jesty, an English farmer, vaccinated his family against smallpox by means of cowpox virus and this is the first case of successful vaccination on record.

Before the days of vaccination, smallpox used to kill about 7 per cent of each generation and only 5 per cent of the population were able to escape the disease.

Vaccination is a surgical procedure and should be carried out by physicians who are experienced and competent to do the work in accordance with clean surgical technique.

Discovery of vaccination. Dr. Edward Jenner of Berkeley, England, had heard that dairymaids were liable to catch "a certain sore called cowpox found occasionally on the teats of dairy cows." Furthermore, he heard that a dairymaid who had had cowpox could not have smallpox. He investigated the subject. By experimenting he proved that one who had recently had cowpox could not be inoculated with smallpox.

Jenner told Hunter his opinion in 1770 and in 1798 he published it. The experience of more than a century has proven that Jenner was right. Everywhere in all lands where people study and know the facts vaccination is appreciated.

Jenner's discovery was made before the days of bacteriology. In recent years the bacteriologists discovered the scientific basis for vaccination against smallpox. Applying the same principles they have discovered effective methods of vaccination against other diseases—for example, typhoid fever, dysentery, hydrophobia, diphtheria, meningitis, and lockjaw in man, cholera in hogs and blackleg in cows.

Dr. Benjamin Waterhouse, the first professor of Theory and Practice of Physic in the Harvard Medical School, early became convinced of the value of Jenner's demonstration and obtained some vaccine virus from abroad. On July 8, 1800, he vaccinated his son, Daniel Oliver Waterhouse, then five years old. This was the first person vaccinated in America, so far as existing records show. Thomas Jefferson helped materially to spread the new doctrine in this country, and, in 1806, in writing to Jenner, said: "Future nations will know by history only that the loathsome smallpox has existed and by you has been extirpated." This prophecy has not yet been fulfilled—though eminently possible.

VACCINATION PROCESS

Properly inoculated, a person susceptible of having smallpox will have a vaccination sore. It will not cause tuberculosis, syphilis, lockjaw, or blood poisoning. Tubercle bacilli cannot live in glycerin. Syphilis is not possible because cows do not have syphilis. If the vaccinated man develops lockjaw or blood poisoning it is because the bacteria responsible got into the vaccination wound from his clothes. If the arm be-

comes very much inflamed and the sore suppurates it is because of pus infection after vaccination.

The vaccination blister is typical in appearance. Suppurating wounds do not protect against smallpox. Very bad arms do not protect against smallpox.

A vaccination scar shows typical pits. These pits can be made out for years. Unless the scar shows them there is no way of knowing that the person is protected against smallpox except by trying to vaccinate him again. If he has a typical scar less than ten years old he will not have smallpox. If he has a scar without pits he cannot be certain that he is immune unless several attempted vaccinations have failed to take.

Where to vaccinate. As most people are right-handed, vaccination is generally done on the outside of the left arm near the shoulder.

It is well to keep the arm reasonably quiet while it is sore and any limitations to the use of the arms causes less inconvenience in the left arm than in the right.

Before the days of pure vaccine and antisepsis there were many large scars on vaccinated arms due to infections that were eyesores to the ladies and consequently there sprang up a desire for vaccination on the leg. These vaccinations are objectionable because the wound cannot so easily be kept clean.

In earlier years the term "varioloid" was used to denote an attack of smallpox that had been modified and rendered mild by a vaccination that did not fully protect. The term is one that works mischief because it leads to the belief in the uninformed that the disease is something different from smallpox and not contagious.

Varioloid is nothing more or less than smallpox. It is now known that neither smallpox nor so-called varioloid occurs in the vaccinated; and the scar noticed in the old days in varioloid cases was not from vaccination but from infection of the site of vaccination.

COMPULSORY VACCINATION

The laws and regulations relating to vaccination in the several states of the United States show marked lack of uniformity. Compulsory general vaccination can be said to exist by law in only a few states such as Kentucky, Rhode

Island, and Porto Rico. Arizona, Hawaii, Maryland, New Mexico, North Dakota have laws requiring vaccination of children. In recent years smallpox has been so mild in the United States that the death-rate has been as low as one death in 500 cases.

Decisions in the various courts in the United States have held compulsory vaccination to be legal. A decision of the Supreme Court of the United States (Henning Jacobson vs. The Commonwealth of Massachusetts, April 1, 1905) upheld in every respect the statute, the validity of which was questioned under the Constitution. The decision says:

> The liberty secured by the Constitution of the United States . . . . does not impart an absolute right in each person to be, at all times, and in all circumstances, wholly freed from restraint. Real liberty for all could not exist under the operation of a principle which recognizes the right of each individual person to use his own, whether in respect to his person or his property, regardless of the injury that may be done to others.

Generally speaking vaccination is not compulsory in the United States except that it is generally required of children before admittance to the public schools and of men before admission to the army.

Germany has a general compulsory vaccination and revaccination law. The law requires the vaccination of all infants before the expiration of the first year of life, and a second vaccination at the age of twelve. Since this law went into effect there have been no epidemics of smallpox in Germany, despite the fact that the disease has been frequently introduced from without.

Anti-vaccinationists. In spite of the facts that are open for the perusal of all, there are still people who style themselves anti-vaccinationists, and who from time to time get into the limelight. They are always people not willing to learn the facts or not capable of understanding, and some of them may be quite normal in other respects. It is probable that there will ever be some of their kind, for there is always someone to take the opposite side of every question. The anti-vaccinationists can only flourish where there is no smallpox in a community, and, thanks to vaccination, that is most of the time. An outbreak among those who have neglected vaccination always puts the anti-vaccinationists to flight until the sad occasion is forgotten.

CHAPTER XLV

DISINFECTION, ISOLATION AND OTHER METHODS OF DISEASE PREVENTION

It is amazing how intelligent people will disregard and evade the quarantine regulations of the health department. The time has certainly arrived when civilized nations should take contagious diseases seriously. The Board of Health regulations are for the good of both the individual and the community. In all these matters the layman should give earnest and conscientious heed to the instructions of the attending physician and the health officer, and in this way lessen the spread of disease and lower the death rate of the community. It is a duty we owe ourselves and our neighbors, to lessen in every way possible the occurrence of disease, whether it be the contagious diseases, the rickets of the child due to improper feeding, the scurvy of the sailor deprived of fresh food, or the consumption that results from bad air, dust, and careless spitting.

SPREADING DISEASE

1. *The drinking cup.* There is plenty of evidence to warrant a severe indictment being drawn against the public drinking cup as a "disease spreader." The diseases which possibly may be spread about by this means are among the more serious maladies affecting the human family, embracing tuberculosis and syphilis, the two supreme scourges of the human race—the Great White Plague and the Great Black Plague. The so-called "loving cup" is a disgrace to modern civilization and should be finally and forever banished. Every individual should carry a small collapsing drinking cup when travelling or when away from home. The time has certainly come when the public should understand that syphilis, the most loathsome of all diseases afflicting the human family, may possibly be contracted from dishes, silverware, and drinking cups. Some form of bubbly fountain has just about replaced the public

drinking cup throughout the country; but even some forms of the bubbly fountain are highly objectionable.

2. *Public libraries.* The likelihood of public libraries acting as disease carriers is now being taken into serious account by library officials in this country and Europe; and on the Continent experiments have been extensively conducted to ascertain the best methods of disinfecting books.

3. *Public funerals.* Unless such funerals are conducted under strict medical supervision and after the premises are properly disinfected, all funeral services where the individual has died of a transmissible disease, should be held in private.

4. *Careless spitting.* If you have tuberculosis, do not give it to others by your careless spitting. Carry around a destructible pasteboard box into which you can spit, and afterwards burn it. Many other diseases can be spread by careless spitting.

5. *Promiscuous kissing.* Attention should be called to the disease dangers that lurk behind this common practice. They are largely the same group as those transmitted by the public drinking cup, to which should be added also tonsilitis and other diseases of the catarrhal group, as well as tuberculosis, colds, syphilis, etc. Many cases of the last named disease are clearly traceable to kissing as their vehicle of transmission. It is in this way that many innocent young women are contaminated for life as a result of indulging in this common, but none the less dangerous, sentimentality. Particularly objectionable is the common practice of promiscuously kissing the baby. If the baby is to be kissed by all the friends and relatives, it would be better to kiss him on the cheek and not directly in the mouth.

6. *Raw fruits,* vegetables, etc., especially those which have been exposed to the street dust of the city, may prove a prolific source of spreading typhoid fever, diarrheal, and other diseases, if eaten before they are thoroughly washed—to say nothing of the fact that raw, dirty vegetables may carry the eggs of numerous worms which infest the soil, and which may develop and grow in the bowel tract of man. Make it a rule either to boil, wash, or carefully pare the fresh fruits and vegetables.

DOMESTIC PETS

Cats and dogs, when kept in the house, must sooner or later become diseased. They will be affected with tubercu-

losis, if nothing else. While these animals are very acceptable companions of children in their outdoor life and play, they are questionable as household pets. Diphtheria and scarlet fever are charged up as being communicated by these animals—also tuberculosis, while there are several forms of parasites—common worms—which infest the intestines of man and which are frequently secured from these animals.

Dogs, cats, and parrots can pick up ordinary contagion from those sick, as in the case of diphtheria, and then give it to others. The teaching is that when a child is sick with contagion the animal pets should be excluded from the room until quarantine is terminated, for a dog cannot be fumigated. The further advice is given that kissing dogs, cats, and parrots, is liable to spread contagion.

"Itch is not nice to think about even when one thinks of catching it from his barber or his friend. It is worse to think of getting itch from a dog. Dogs and cats have several kinds of itch, each capable of transmission to man."

When plague threatens, pets become of increased importance, for this disease is spread by a flea, which, while it prefers the rat, is willing to take up temporary residence on any domestic animal.

Hydrophobia would die out if it were not kept going by the lower animals, and especially by dogs.

RATS, FLEAS AND BEDBUGS

It is now pretty thoroughly demonstrated that both rats and fleas are concerned in the spread of the bubonic plague—an oldtime scourge that was dreaded by all nations. From eating the corpses of the victims of plague and in other ways, the rat infects himself with this disease. These infected rats are carried from port to port, from continent to continent, by means of ships. Fleas infest these rats, suck their blood, and subsequently bite human beings and infect them with this deadly disease. (Fleas also have been charged with spreading typhus fever and leprosy.) Fleas and rats are no doubt concerned in other mischief as regards the spread of disease, but with this much knowledge at hand, it behooves every civilized nation to instigate a thorough war on rats, and, if possible, eradicate these pests, who have proven themselves to be the agency for the spread of this terrible plague.

It is now stated that the ground-squirrels are a menace;

that they may take the germs of bubonic plague from rats, and make it endemic in California. The only real remedy there seems to be is persistent war on rats till all are destroyed.

The ordinary household bedbug is not unlikely a guilty party to the spread of disease, but, like the fly, until very recently it has escaped the attention of the detectives of science; yet, from our present knowledge of the rôle of various insects and pests in the causation of disease, we must come to regard this blood-sucking insect with grave suspicion. The bedbug has been seriously charged with spreading smallpox; while body lice are blamed for carrying typhoid and relapsing fever.

MOSQUITOES AND DISEASE

The blame for carrying both malaria and yellow fever has been conclusively fastened upon the mosquito. One particular species carries malaria. Biting an individual afflicted with this disease, it takes a parasite into its system, which subsequently burrows into the wall of its stomach, and there goes through a cycle of development, from which its eggs are carried to the salivary glands and, in the act of biting the healthy individual, they are injected into his blood, where they hatch out after a certain number of hours, flooding the system with the plasmodium parasite and its poisons, thereby bringing on the unpleasant attacks of alternating chills and fever.

The study of yellow fever in Cuba thoroughly demonstrated that it was transmitted by a species of mosquito, the same as malarial fever; and the destruction of mosquitoes has practically driven yellow fever out of Havana, which, until recently, was regarded as its home.

As in the fighting of flies, the diseases transmitted by the mosquito are best fought by directing efforts against its breeding places, and by effectually screening all dwelling places against the entrance of mosquitoes, and especially protecting patients afflicted with malaria or yellow fever, from the mosquito.

Many experiments have been made to determine how best to destroy mosquitoes and their breeding grounds. It should be remembered that they breed in warm weather wherever stagnant water is found, whether it is in the marsh, the pond or the rain barrel. Ordinary coal oil or kerosene has been found to be one of the most effective means of destroying these insects and their eggs.

DISINFECTANTS AND DEODORANTS

Deodorants are substances which destroy odor and cause the premises to smell sweet, but they are not necessarily disinfectants; that is, they may not kill germs. Disinfectants proper are substances which have power to kill germs. Heat, fire, and sunlight are Nature's disinfectants. Chloride of lime and copper sulphate are good disinfectants to sprinkle about cellars, closets, and other places where it is desired both to disinfect and deodorize.

In typhoid fever and cholera the germs are carried in the excretions. In these diseases nothing is to be gained by efforts to disinfect the air or anything else except these excretions or things touched by these excretions.

In consumption, pneumonia, and diphtheria the disease is spread by the mouth secretions, including the sputum. To sterilize these secretions heat should be used. It is feasible to burn most of the cloths, handkerchiefs, and napkins that have been used.

While the case of infectious disease is active, double effort should be made to keep things clean. The air must be kept clean. The windows must be kept partly open all the time and at intervals the room must be aired. The blinds must be up to let in some sunlight.

The position taken by the New York Health Department is that "disinfection of most effective sort is performed by air and sunlight," and that, in view of the tendency of contagion germs to die quickly when dried, formalin disinfection is seldom required.

Says Dr. Evans: "Fumigation as a means of destroying bacteria is losing ground. There are certain communities where it is still employed quite generally. There are many people who believe in it. There are others who are willing to take all other precautions and to fumigate besides."

METHODS OF DISINFECTION

1. *Air.* It is quite impossible to disinfect the air of a room during its occupancy. In fact, ordinarily little heed need be given to the air itself. Any of the known substances in sufficient concentration to kill micro-organisms would render the air unendurable. It is absurd to place such substances as carbolic acid, formalin, or chlorinated lime in an open pan in

the sickroom, or in the bathroom with the idea that they are serving a useful purpose in disinfecting the atmosphere or in preventing the spread of infection.

2. *Rooms.* The disinfection of a living room calls for all the resources of the disinfector's art. The fact that it is necessary to bring the apparatus and materials to the room in order to disinfect it and its contents is one of the main difficulties and will often require the ingenuity and always the vigilance of the operator.

3. *Feces.* The disinfection of feces is most important because these discharges are most dangerous and at the same time most difficult to render safe. Fecal discharges may be disinfected with carbolic acid, cresols, lime, chlorinated lime, or formalin.

From the patients the discharges should be received in a glass or impervious vessel containing some of the germicidal substance, more of which is added afterwards, and the mass thoroughly mixed. The mixture should stand at least one hour before the contents are disposed of, and the vessel given a thorough cleansing and disinfection before it is used again. At least an equal quantity of the germicidal solution should be used to the mass disinfected and enough should always be added to entirely submerge the mass. Excreta must always be protected from flies and other insects, even while undergoing disinfection.

Milk of lime. Use freshly prepared milk of lime containing one part by weight of the freshly slaked lime to four parts of water. Add at least an equal quantity to the amount of material to be disinfected and allow the mixture to stand no less than 2 hours before final disposal. The perfunctory sprinkling of fecal matter with milk of lime, as is often done, is not effective.

Carbolic acid. A 5 per cent solution of crude carbolic acid added to an equal bulk of excreta may be depended upon to disinfect in 1 to 2 hours, provided the germicide is thoroughly incorporated throughout the mass.

4. *Sputum.* The most trustworthy chemical disinfectants for sputum are carbolic acid 5 per cent; formalin 10 per cent or stronger, chlorinated lime 3 per cent. Sputum should be kept well covered in suitable receptacles until it is disposed of. Simply keeping water in the bedside cups, or in cuspidors will prevent whatever slight danger exists in the dissemination

of infection from such sources. Antiseptic solutions may be used for this purpose, but are not necessary.

5. *Bed and body linen.* Fabrics, such as towels, napkins, handkerchiefs, sheets, pillow slips, and similar articles, should always be disinfected after contact with any of the communicable diseases, for they are apt to become infected. They may be steamed or boiled or immersed in a germicidal solution such as carbolic acid, 5 per cent, formalin, 10 per cent, or bichlorid of mercury, 1 to 1,000.

6. *Books.* With the exception of their external surface, books cannot be disinfected in the bookcase or on the shelves of houses and libraries. However, if the books have not been handled or exposed to infection in any way except by their presence in the sickroom there is no reason for considering any part of the book, except the exposed surface, as infected. Such books may be disinfected by exposing them to formaldehyde gas without first disturbing them in any way.

7. *Thermometers.* A thermometer may be the source of conveying disease from one patient to another, and it behooves the physician to exercise special care concerning its cleanliness and disinfection. The best practice is to keep pure formalin in the thermometer case in which the instrument is kept constantly bathed.

DISINFECTING AGENTS

The time required for *light* to destroy bacteria varies with its brightness and with conditions such as moisture, temperature, and transparency. The time also varies with the different micro-organisms; plague bacilli and cholera vibrio usually die more quickly than tubercle bacilli. Spores are much more resistant to the influence of the chemical rays than the bacterial cells themselves. Thus it usually requires about 30 hours sunning to kill an anthrax spore, while anthrax bacilli are killed in one or two hours under the same conditions.

1. *Ultra-violet rays.* Ultra-violet rays obtained from the Cooper-Hewitt mercury vapor lamp and other similar devices have an exceedingly powerful germicidal action, killing spores as well as bacterial cells. This method has recently come into use for the sterilization of water and other substances.

2. *Burning.* Fire is the great purifier. In actual practice the disinfector often comes across a great amount of rubbish and articles of little value that he will find safer and cheaper

to burn than to disinfect. The burning of garbage and refuse is the safest means of disposing of such organic substances from a sanitary standpoint, especially in districts where pestilential disease prevails.

3. *Boiling.* Boiling is such a commonplace, everyday procedure that it is often neglected in practical disinfection, despite the fact that it is one of the readiest and most effective methods of destroying infections of all kinds. An exposure to boiling water continued for an hour will destroy the living principles of practically all the infectious diseases. To be sure, there are a few spores that have shown a remarkable resistance to boiling water and steam in laboratory experiments. Boiling, therefore, cannot be entirely depended upon where tetanus, anthrax, or resisting spores are in question. As a matter of fact, a degree of moist heat much lower than the boiling point of water is effective against the great majority of the known viruses. Boiling is especially applicable for the disinfection of bedding, body linen, towels, and fabrics of many kinds, also kitchen and table ware, cuspidors, urinals, and a great variety of objects.

4. *Steam.* Steam is one of the most satisfactory disinfecting agents we possess. It is reliable, quick, and may be depended upon to penetrate deeply. Further, it does more than disinfect, it sterilizes. Vegetating bacteria are killed instantly and most spores in a few minutes. It may therefore be used to destroy the infection of any one of the communicable diseases. Either streaming steam or steam under pressure is used in practical disinfection. Streaming steam has the same disinfecting power as boiling water, and an exposure of half an hour to an hour is sufficient.

DISINFECTANT SOLUTIONS

1. *Bichlorid of mercury* is usually used in the proportion of 1 to 1,000, which is ample for the destruction of all the non-spore bearing bacteria, provided the exposure is continued not less than half an hour. Many bacterial cells are killed almost at once when brought into direct contact with a solution of this strength, and the great majority perish within 15 minutes. The extra time allows for penetration and provides a factor of safety.

2. *Carbolic acid.* Carbolic acid is a very useful disinfecting substance with a wide range of application. It should not

be depended upon to kill spores. As it does not coagulate albuminous matter as actively as corrosive sublimate it may be used for the disinfection of soiled clothing and bedding, as well as for excreta and sputum.

3. *Lysol.* Lysol is a brown, oily looking, clear liquid with a creosote-like odor. It is more powerful as a germicide than carbolic acid, and is usually used in 1 per cent solution.

4. *Lime,* or quicklime, is a very caustic substance used for the destruction of organic matter as well as germ life. On account of efficiency and cheapness it is a very valuable addition to the list of practical disinfectants.

Chlorinated lime ("chlorid of lime"). Chlorinated lime was used as a disinfectant and deodorant long before bacteriology was a science. Chlorinated lime under certain circumstances, in fact, is one of the most powerful germicides we possess, and has been used particularly for the disinfection of sewage and water.

5. *Soaps.* Unfortunately, the disinfecting power of soap solutions is not marked enough to make them trustworthy disinfectants despite their great value as detergents. The common commercial soaps, especially the colored soaps, are frequently of very poor quality, containing rosin instead of fat, and are not to be depended upon. The soft soaps should also be avoided on account of the presence of all the impurities of the fat and alkali from which they are made. There are other conditions which render the use of soaps uncertain, the chief of which is the hardness of water.

CHAPTER XLVI

THE PREVENTION OF SEX DISORDERS

A book on the prevention of disease would not be complete if we followed the custom of the past and said nothing about sexual diseases. On the other hand, it is out of the question to undertake to go into this important subject thoroughly in a work of limited size, a book which discusses to some extent, the prevention of all forms of disease. We will, therefore, in this chapter give brief and concise consideration to the prevention of numerous sex diseases and refer the reader to works devoted wholly to this subject in case further information on this vital theme is desired.

THE SEX QUESTION

Everything possible should be done to separate the discussion of sex from all ideas which are either mysterious or sordid. Sex hygiene should be considered in a sane, natural and physiologic manner just as we would discuss the hygiene of digestion or respiration. Parents and teachers should see that this subject is taken up with children and properly discussed in a natural fashion in connection with the study of general hygiene on the one hand and the discussion of physiology on the other. We think it is a great mistake to set aside sex hygiene in some sort of special fashion and to discuss it with the child or youth in a way to give it undue emphasis in their minds.

As children grow up they ask questions about their origin and it is an easy matter to answer these questions so as to gradually impart to them the requisite knowledge regarding sex matters without over-arousing their curiosity and without undertaking to teach too much at any one time. The story of sex should start out with a child in its infancy when it first asks its mother where it came from and it should be continued on the installment plan up to the adolescent years, by which

time the whole story should have been pretty well told. There is still additional information to impart which should be given in appropriate installments and at appropriate times to the young man and young woman as they grow up and mingle with their fellows, engage in courtship; and the final chapters of sex instruction should be imparted just prior to their marriage.

We believe it is a great mistake to sit down with a child when it is ten, twelve, or fourteen years of age, and say to it, "Now the time has come when you should understand some things about sex," and then to pour into the innocent and ignorant child's ears the full story of sex and sex relations. I say, this is a great mistake. I believe the better method is to impart this instruction over a long period of years in a natural and normal manner. In other words, to always be ready faithfully and fully to answer the child's questions, but as a rule to volunteer no information. Wait until the child's mind is ripe and ready for the knowledge; for that time when he is actually asking information on some particular point of this subject, and then supply that information in a frank and natural manner, and then stop—say no more. Wait until further inquiries are aroused in the child's mind.

In other words, always answer his sex questions but never volunteer advance information on sex matters. Wait until he asks for it. Of course, this presupposes that the parent has the child's confidence; that the child, if he wants to know anything about sex will ask his parents and not seek the information from older and better informed companions, or from other adults in the neighborhood.

If, for any reason, the child fails to make inquiries on these lines, then suitable information can be given from time to time so that by the time they reach puberty, either the boy or girl will have had instruction which any youth should have to guide themselves aright at this important time of life.

In this way much of our sex miseries can be prevented. In all the realms of health and disease there is certainly no place where prevention can do so much good as in this sphere of sex hygiene.

THE GREAT BLACK PLAGUE

If we are justified in denominating tuberculosis the Great White Plague, we certainly are justified in calling venereal

disease the Great Black Plague. Of the several sex diseases, there are just two that deserve chief attention when it comes to the discussion of their prevention, and they are syphilis and gonorrhea.

Syphilis was undoubtedly discovered by Columbus along with America, and his sailors are believed to have carried this disease back to Europe where in a short while it spread over the entire civilized world. Along with tobacco and Indian corn it represents America's contribution to latter-day civilization.

It is estimated that there are 4,000,000 persons in the United States who have had syphilis some time in their past lives. It has been stated on good authority that eight out of every ten men in New York have had gonorrhea, and that three out of every five married women have acquired the disease in some degree as the result of its prevalence among the male population. Surgeons and gynecologists estimate that 70 per cent of operations done on the female pelvis are the result of gonorrheal infections, and that 80 per cent of the deaths from infection and inflammation of the female generative organs are the result of this same disease.

Other authorities estimate that about 50 per cent of the sterility of both men and women is caused by gonorrheal infection. It is believed that about 10 per cent of our blindness, and about 75 per cent of the blindness of the new-born, are due to this disease.

Taking the country as a whole, students of this subject have arrived at the opinion that about one man in ten in the United States has syphilis; whereas, only about one woman in fifty is infected with this disease.

Pusey thinks that 5 per cent of men and 1 per cent of women of this country are syphilitic—about 3 per cent of the entire population.

We know that 80 or 85 per cent of American prostitutes have syphilis at some time.

While we do not know the exact number of deaths due to venereal infection—because of the fact that the death certificates do not state these facts, but attribute death to some other complication or associated disorder—it is safe to say that more people die each year from venereal infections in the United States than from tuberculosis. One authority estimates two and one-half times as many.

It is probable that at any time about 5,000,000 men and

women are suffering with some stage of gonorrheal infection in this country.

In the United States Army the rate of syphilis is probably not over 5 per cent, or one case in every twenty men, at the present time.

On the average, syphilis shortens life four or five years. In 25,000 insurance risks, life was shortened five and one-half years.

GONORRHEA

Gonorrhea is an infection of any mucous membrane by the gonococcus microbe. It may involve the eye and the joints as well as the sex organs. It is nearly always contracted during sex relations. This germ many times invades the blood and may result in producing heart disease or rheumatism, and when it affects the eye it sometimes results in blindness, particularly in the case of the new-born babe.

This infection usually comes on five or six days after exposure, and the early symptoms consist in painful urination accompanied by a whitish discharge. The disease in some cases runs a short acute course for a few weeks, and in others it becomes chronic, infecting more deeply seated organs, like the prostate gland in the male, or the fallopian tubes in the female, in which case it runs a course for months or even years.

It is this chronic form in the male that makes so much trouble in the case of marriage and results in infecting so many innocent wives, leading to mutilating surgical operations, and thus, in many cases, making it impossible for the young wife to become a mother. Sterility is therefore one of the serious consequences of gonorrheal infection. In this way, as well as by producing stricture and in numerous other ways, do these veneral infections cripple for life and though gonorrhea does not often result in death, it is a great destroyer of health, happiness and fertility.

Prevention. This is a disease that can be prevented by laying special emphasis on the necessity of early and thoroughgoing treatment. We must do more to inculcate in the rising generation the proper fear of this calamitous infection. We must counteract the older teaching that an infection of this sort was "no worse than a bad cold." We must teach young men to remain out of wedlock until they are thoroughly cured

of this disease if they have failed to keep themselves free from this infection.

The complement fixation test is a blood examination which should be made in all cases where there is doubt as to whether or not a gonorrheal patient is cured. This test should be made in addition to the other observations which a trained physician will make in cases of this sort.

Much can be done toward the prevention of venereal infection by early home training of the proper sort which will impress upon men not only the dangers of venereal infection on the one hand, but also teaching which will make it clear to our young men that they can enjoy perfect health and be real men, at the same time lead clean and wholesome lives, free from all forms of sexual transgression. Physicians especially should see to it that the young men of the families under their care are properly instructed in these matters. The young men must be clearly taught that sex relations are not essential to health; that continence is in every way consistent and compatible with the enjoyment of the highest degree of health and the development of the highest degree of physical manhood and sex virility.

It is needless to say that in the treatment of the disorder, the most skilled physician should be sought, and under no circumstances should gonorrheal infection be treated by means of drug store nostrums, nor should any reputed system of home treatment be trusted. In case of infection go to a dispensary, a specialist, or to your family physician who will either treat the case or refer you to proper help.

SYPHILIS

Syphilis is a disease caused by a small animal parasite called the spirocheta pallida, and while this whole volume might be filled with the description of the symptoms and sorry results of syphilis, the following summary by Stokes is right to the point:

Summing up briefly the main points to bear in mind about the course of syphilis—there is a time, at the very beginning of the disease, even after the first sore appears, when the condition is still at or near the place where it entered the body. At this time it can be permanently cured by quick recognition and thorough treatment. There are no fixed characteristics of the early stages of the disease, and it often escapes attention

entirely or is regarded as a trifle. The symptoms that follow the spread of the disease over the body may be severe or mild, but they seldom endanger life, and again often escape notice, leaving the victim for some years a danger to other people from relapses about which he may know nothing whatever. Serious syphilis is the late syphilis which overtakes those whose earlier symptoms passed unrecognized or were insufficiently treated. Late syphilis of the skin and bones, disfiguring and horrible to look at, is less dangerous than hidden syphilis of the blood vessels, the nerves, and the internal organs, which under cover of a whole skin and apparent health, maims and destroys its victims. Locomotor ataxia and softening of the brain, early apoplexy, blindness and deafness, paralysis, chronic fatal kidney and liver disease, heart failure, hardening of the blood vessels early in life, with sudden or lingering death from any of these causes are among the ways in which syphilis destroys innocent and guilty alike. And yet, for all its destructive power, it is one of the easiest diseases to hold in check, and if intelligently treated at almost any but the last stages, can, in the great majority of cases, be kept from endangering life.

Treatment. The "golden period" for treating syphilis is within a few days from the first appearance of the disease. If it is allowed to go into the third stage, it is almost impossible to bring about an absolute cure. That is, to thoroughly and forever eradicate the syphilitic organisms from the body, though cases thoroughly and persistently treated show no further symptoms of the disorder, and when the Wasserman has been negative for four or five years, they may marry without fear of having tainted offspring. Proper treatment in the early secondary stages of the disease will result in curing 99 per cent of the cases.

The public should understand that the newer remedies like "606," or salvarsan, are not specific cures for the infection. Mercury, the old standby, is still the chief agent used in the treatment of the disease. "606" is simply another and valuable remedy, especially in the early stages of the infection.

Prevention. Syphilis is a disease not only spread by sex contact, as it is in the majority of cases, but it is also acquired in other ways—from drinking cups, towels, eating utensils, brushes, combs, razors, surgeons' and dentists' instruments, kissing, etc. The disease usually appears about three weeks after exposure. At the site of inoculation on the sex organ

or the lips a small sore appears with enlargement of the neighboring lymph glands. After six weeks the secondary stage appears, with fever, sore throat, headache, and a general skin rash. Sometimes the hair drops out and white patches are found in the throat and mouth. This is an indefinite stage and lasts anywhere from a few months to several years, and yet it is sometimes so slight as to escape notice on the part of the patient. They think they have simply had a slight cold or something of the kind which has been hanging on. With the passing of this form of infection, the third stage is reached, which, unless the disease is properly treated and cured, continues throughout the rest of the patient's life. It is the stage of degeneration and the attack of the syphilitic organism upon the brain, spinal cord, and other internal organs. A possible fourth stage of the disease might be known as softening of the brain or locomotor ataxia which comes on anywhere from ten to thirty-five years subsequent to the infection.

A person probably is not infective for syphilis after they have had the disease three or four years.

Syphilis may be transmitted from the mother to her unborn child. It is a case of prenatal contagion rather than heredity. Syphilis is said to be the cause of 40 per cent of all miscarriages. Fortunately in the case of children born with syphilis, more than 75 per cent of them die soon after birth. Those who live are stunted and defective.

Wassermann test. Certain practical details about this test are of interest to everyone. Blood for it is usually drawn from a small vein in the arm. The discomfort is insignificant —no more than that of a sharp pin-prick. Blood is drawn in the same way for other kinds of blood tests, so that a needle-prick in the arm is not necessarily for a Wassermann test. There is no cutting and no scar remains. The amount of blood drawn is so small that it does not weaken in the least. The test is done on the serum or fluid part of the blood, after the corpuscles are removed. It can also be done on the clear fluid taken from around the spinal cord, and this is necessary in certain syphilitic nervous diseases. There is nothing about the test that need make anybody hesitate in taking it, and it is safe to say that when properly done, the information that it gives is more than worth the trouble, especially to those who have at any time been exposed even remotely, to the risk

of infection. But the test must be well done in a large hospital or through a competent physician or specialist, and the result interpreted to the patient by the physician and not by the laboratory that does the test, or in the light of the patient's own half-knowledge of the matter. While the Wassermann test is not infallible, I regard it as the most reliable single evidence of syphilis—not overlooking, of course, the actual manifestations of the disease—and we regard it as an authentic indication of the presence of the disease nine times out of ten, when the test shows positive in the hands of a competent technician.

Osler says two years is safe for marriage after repeated negative Wassermanns. Hoffman's rule—if no symptoms for two years, then they may marry from three to five years after the onset of syphilis.

Men have normal children five years after infection even though 50 per cent show positive Wassermann tests. Within the first three years a positive Wassermann test should mean postponement of marriage. Well treated cases after five years may marry independent of the Wassermann test.

OTHER VENEREAL DISEASES

Soft chancre, in contradistinction to the chancre which constitutes the initial lesion of syphilis, is a semi-filth disease of microbic origin, associated with and affecting the sexual organs. It is not always easy for the novice to differentiate between this local and apparently harmless chancre and the initial lesion of syphilis, but the experienced physician will always be able to make such a diagnosis. This disease is purely local and leaves no known constitutional after effects. It has led many of its victims to fear that they had syphilis, and to spend unnecessary worry, time, and money in being treated for a disease they never had.

Much of the prostatic trouble of old men and the so-called "female complaints" of women owe their origin to venereal infections, while of course many instances are due to perfectly natural causes—to age in the case of prostatic enlargment—and are in no way connected with these diseases of sex misbehavior.

Many cases of so-called "female complaint"—if they are not more or less imaginary—owe their existence directly or indirectly to the performance of abortions. One authority,

not long since, estimated that one-half of all pregnancies in the United States were terminated by abortion, while another physician estimated that there are between 50,000 and 75,000 abortions performed each year in Chicago.

THE PREVENTION OF VENEREAL DISEASE

Of all the problems of preventive medicine there is none that has probably produced so much discussion and resulted in so much heated argument as the question of the prevention and control of venereal disorders. In our large cities some believe in segregating prostitutes in the red light district; others believe in breaking up these segregated districts and scattering the prostitutes throughout the city, and it is certainly out of the question in a work of this sort to undertake to discuss or settle these mooted questions of public policy and sanitary procedure.

We are more concerned at this time with the prevention of disease in the individual, and in this connection I will say that it is my belief that the venereal problem will never be solved until we train our youth, particularly our sons, to look at this matter in the proper light, and to understand that they can grow up to manhood and keep themselves free from those practices which constitute exposure to venereal infection.

We must teach the young man what to do with his sex urges; how to control his mating instinct. We are not going to make progress by following our false policy of putting the soft pedal on this question. We must recognize that sex is just as much an inherited instinct as religion or ambition, or the play instinct. Our boys and girls are young sex animals. Let us face the facts and go to work and teach them how to control this instinct and conduct themselves consistently in the presence of the ideals and organization of modern society. Self-control is the thing which we must give our youth if we are going to successfully stem the tide of venereal infection.

There is little to be gained by teaching the young man concerning the terrors of syphilitic infection, while at the same time we neglect to teach him how to associate with the opposite sex and to conduct his courtship so as to keep out of temptation. The prevention of venereal diseases is a matter which has to do with proper methods of dancing. It embraces all the details of our association with the opposite sex. The prevention of our so-called modern "petting parties" is a part

of the prevention of venereal diseases. An avalanche of sex emotion is a well nigh impossible thing to control when it has gained full headway, but is a matter of easy control when we pay attention to the individual factors that go to make up these emotional hurricanes that sweep youth off their feet and land them, before they are aware, in some whirlpool or maelstrom of vice and venereal infection.

Instruction of our youth should extend not only to the maintenance of ideals, to the practice of self-control, to those warnings of the dire consequences of venereal infection, and to the dangers of illigimate pregnancies, but should also appeal to the young man to keep himself clean and healthy to become the head of a future family, and the father of strong and robust children. In brief, the young man should be taught that he is a trustee of the stream of life, the germ plasm of the race, and that he should in every way possible keep himself a fit channel to pass it on unharmed and untainted as the life-bearing stream to succeeding generations.

Early proper training and avoidance of undue curiosity will assist in keeping the average young man out of such vile, vulgar, and profane company as is found in the average brothel, and herewith we come to the question of alcohol. It is the effect of alcohol upon youth often times that leads them to take their first steps in vice. Many well-trained young men if sober would not go into the profane, degraded and vile surroundings of a modern house of ill-repute, but through alcohol, the great deceiver, which, while it benumbs the higher senses and anesthetizes the fine nature—at the same time grossly stimulates the lower animal propensities of the body.

ASSOCIATION OF THE SEXES

While I believe in co-education, in allowing boys and girls to grow up in normal fashion in the family, in society, and the school, I believe in thoroughgoing restrictions which properly control the association of the sexes, and in the prevention of those undue intimacies which are so productive of mischief, in this connection, whether they be the improper physical contact in play, the ballroom, or bathing beaches, or in other of our modern social, athletic, and play activities.

Young people must be taught that the sex reaping, that the sex act with all its consequences, a new life to be born into the world, may be contained in the very small beginning of

careless contact, intimate association, unwise steps that seem trifling in themselves. We must all come to recognize that human emotion is a thing starting with a very small seed which rapidly grows, one step leading almost unseen to the next, so that it is unsafe to take the first step, for having taken the first step, many weak persons will find themselves utterly helpless as they drift with the emotional tide on to the sure and quick culmination of these strong and natural urges of the mating instinct of human nature.

Now there is much we can do in our fight against social transgression and venereal infection by controlling the plays, moving pictures, books, and other literature which our young people view and read. Hard work, outdoor exercise, keeping busy, are all aids in this fight for moral control, for disease prevention. Idleness of brain and body is always dangerous in the case of the growing youth.

We must also recognize in this connection that undue intimacy and over-free association of the sexes which serves to arouse the sex emotions, but which does not permit of their satisfaction and gratification, serves to create a condition of mind and body which is inimical to good health, especially to good nervous health. In this way, overstimulation and consequent continuous suppression of our emotional urges and sex desires, contributes, in certain predisposed individuals, to nervous break-downs, and other forms of ill-health. It would seem as things are in modern civilization, that it is unwise in youth to indulge in undue intimacy prior to marriage, as the over-arousal of the emotional life is not a healthful procedure when emotional suppression must be practiced.

It is probable that sex morality is not only favored by good hygienic living, as regards bathing, exercise, fresh air, etc., not only by clean reading, good books, good plays, etc., but also by proper diet. Physicians are coming more and more to believe that overeating, particularly of highly seasoned foods and too much meat and eggs, has a tendency to overstimulate the sexual system.

PROPHYLACTIC TREATMENT

In case of the newborn babe a few drops of 2 per cent solution of silver nitrate or a 20 per cent solution of argyrol, is put in the babe's eyes immediately after birth. This is to prevent the possibility of gonorrheal infection causing blindness.

Now these same drugs when used early after exposure to venereal infection are probably of value in preventing the disease, and so in recent years the United States Army and Navy have carried out a regular program of requiring soldiers and sailors when on leave from ship or garrison to report to the surgeon on return for treatment of this nature. This has led to much discussion in recent years as to the wisdom of such a course of procedure. It has been urged by many that immorality is encouraged by robbing these diseases of the terror of infection. The Government takes the attitude that the soldier has no right to deprive the state of his services while further making himself a burden and expense for care while sick and infected.

The average physician, no matter how high his ideals, feels that anything and everything that can be done to prevent disease is legitimate, and when he thinks of the innocent who suffer along with the guilty in this matter of venereal infection, he is rather inclined to believe that any and all methods are justified which will serve to prevent the spread of disease. My own attitude would be that having done everything we can to prevent these diseases by home training and subsequent instruction to our youth, that if moral persuasion and hygienic instruction fail, if the frailties of human nature are such as to lead the weak to yield to temptation, then we are justified in trying to prevent disease under any and all circumstances, and therefore that we should not decry the Army and Navy practices because they are not ideal. In a word, the physician should prevent disease under any and all circumstances, particularly in cases of this sort, where, as we have said, the health and happiness of many innocent women and even unborn children are in jeopardy.

We do not deem it wise in a work of this limited nature to undertake to describe the methods employed in the prevention of venereal diseases, and we doubt that they would be successful, as a rule, unless used under the immediate supervision of an experienced physician.

SEX HYGIENE

While the prevention of self-abuse or masturbation is a highly desirable thing, since these practices are not directly connected with specific diseases, only related in their exaggerated forms with the health in general, and that of the nervous

system in particular, we deem it unwise to undertake their full discussion in a work of this sort, and believe that those who are looking for help along this line will get more benefit by consulting reliable works devoted to this subject. It would be in place in this connection, however, to call attention to the fact that diseases of this sort are not only prevented by proper moral instruction given to children early in life, but by a thorough régime of cleanliness, proper bathing, and that in case of male babies, the greatest of all means of preventing masturbation is early *circumcision.* Young children should not be allowed to sleep together. Their diet should be simple, and they should be allowed to have abundance of exercise.

Young men should also, before approaching puberty, be freely taught about the occurrence of nocturnal pollutions or so-called wet dreams, and these things should be explained to them as being perfectly normal and natural and in this way much unnecessary worry on the part of our youth would be prevented, but as I have said, it seems out of place to go into these questions fully in a work of this nature, which is devoted more specifically to the discussion of the methods of preventing definite diseases.

Sex hygiene in married life. This is a large subject and one impossible of full treatment in this place, but we believe that both men and women should secure painstaking medical advice before marriage, and that with proper instruction of this nature or that which can be secured from reading suitable books (and you had better have your family physician secure the books for you) much sorrow and unhappiness could be avoided in the early period of the average married life. Again, important as this subject is, it is not directly concerned with the prevention of specific diseases, and therefore those who are interested are referred to books devoted to the subject.

HOW TO FIGHT THE BLACK PLAGUE

The repeated sifting of the facts which have accumulated in recent years by important investigations, such as that of the Sydenham Commission in Great Britain and the Society for Combating Sexual Disease in Germany, and the legislative programs already under way, have gradually crystalized into fairly definite form, the undoubted essentials of a program for controlling venereal diseases, syphilis among them. These have been summarized as follows:

1. The provision of universally available good treatment, at the expense of the state, if necessary, for the disease in question.

2. The provision by the state of efficient means of recognizing the disease at the earliest possible time and with the greatest possible certainty in any given time.

3. The suppression of quack practice, drug store prescribing and advertising of cures for these diseases.

4. Moral and educational prophylaxis and the vigorous suppression of prostitution.

In addition to these measures, which are common to all proposals and working systems for the control of sexual disease, certain other recommendations may be classed as debatable, inasmuch as they are still under discussion. These are as follows:

1. General instruction in personal prophylaxis for the population at large; the removal of the whole question from the realm of religion and ethics.

2. Compulsory measures and penalties obliging patients to receive treatment and continue it until cured, regardless of their own desires in the matter.

3. Notification or reporting of cases of sexual disease to the health authorities, treating these diseases just as we do smallpox or tuberculosis.

4. Indirect legislation, as it might be called, which aims to detect infected persons before they enter on marriage rather than at the outset of the disease, either by releasing the physician in charge of the case from the bond of professional confidence, or by requiring health certificates before marriage, and which annuls marriage after infection is discovered.

Last but not least, let us emphasize continence. One of the important facts to teach boys is that continence is compatible with health. The sex glands are like the tear glands and the sweat glands, in that they do not atrophy with disuse. Benjamin Franklin taught, as many another man of influence believes today, that the exercise of the sexual functions is necessary for health. This is a mistake and has done much harm. A statement declaring that there is no evidence that abstinence is "inconsistent with the highest physical, mental, and moral efficiency" has recently been signed by 360 of the foremost medical authorities in the United States.

CHAPTER XLVII

MENTAL AND NERVOUS DISEASES

While the general tendency toward the majority of mental diseases and nervous disorders is determined by heredity; nevertheless, there is much to be done looking toward the prevention of the manifestation of these tendencies in the individual.

In particular we should become familiar with the best methods of preventing functional nervous disorders—those conditions which range from chronic worry up through neurasthenia to hysteria. These nervous disturbances seem to be on the increase at the present time and it is highly important that the layman become familiar with the fundamental principles of good mental hygiene.

NEURASTHENIA—NERVOUS EXHAUSTION

The neurasthenic is an individual who presents sound organic findings at the time of his examination, but who also presents evidence of lowered nerve tone. He is in some respects like a battery which, while it is sound, is run down, it needs to be charged up. Perhaps to begin with, from his ancestors he received a small amount of nerve capital and the slightest emotional stress or strain leaves him virtually a neurologic bankrupt. Some nationalities are peculiarly subject to these functional nervous disorders. The Hebrew race, together with the Slavs are particularly predisposed to brain fatigue and nervous breakdown, and it would seem the whole American stock is also more or less subject to this sort of thing.

Symptoms. Neurasthenia is characterized by great nervous irritability and by mental or nervous fatigue out of all proportion with what could be expected from normal mental and physical activities. This constant fatigue, which is sometimes very much worse upon first arising in the morning, is accompanied by a vast assortment of unpleasant sensations and other symptoms in the head and various parts of the body. This

fatigue is usually very much less as the day wears on, more particularly in the evening after supper. Neurasthenics seem to be improvident in storing up their nervous energy, or else extravagent in spending it; at least they are always short—suffering from lowered nerve tone. Among the minor nervous symptoms which afflict these patients may be mentioned a series of functional nervous disturbances embracing headache, backache, insomnia, dyspepsia, and chronic constipation, not to mention a host of sensory troubles which are often most annoying and which manifest themselves in the skin variously as itching, pricking, burning, creeping, crawling, and other abnormal sensations.

Earmarks of neurasthenia. Aside, then, from the characteristic neurasthenic fatigue and the before mentioned numerous symptoms or sensory vagaries, the neurasthenic state is marked by four cardinal and characteristic symptoms.

1. *Increased suggestibility.* The patients are prone to think they have any and all diseases they hear or read about.

2. *Oversensitiveness.* Their feelings are always being hurt. They seem to wear their feelings all on the outside of the body in the skin.

3. *Abnormal impressibility.* They are overimpressed with everything that happens, not excepting their own thoughts and feelings.

4. *Increased emotionalism.* They often cry if you point a finger at them, and sometimes weep if you don't.

All of this mental and nervous condition brings about a state of mental confusion—disturbance of memory—and this sometimes gives the patients great concern. They feel that they are on the sure and quick road to insanity, and of course it goes without saying they find it difficult to "make up their minds": that is, decision is greatly delayed, terribly hampered, and they sometimes wear themselves out trying to decide whether to get a soft hat or a stiff hat, or whether to set the black hen or the Dominique hen.

Causes. Heredity must be named first among the causes of these nervous tendencies. Other causes follow, varying in different individuals, and include physical strain, chronic worry, all things which contribute to uncertainty and indecision, chronic constipation and associated autointoxication, poisoning from various sources such as alcohol, tobacco, and excessive use of tea and coffee, as well as the toxins generated by mi-

crobes as in attacks of influenza, typhoid fever, chronic tonsilitis, and abscessed teeth, not forgetting the toxins of syphilis. Many authorities believe that sexual excesses also contribute to this condition.

It is certain, in the case of those persons who are predisposed to functional nervous disorders by heredity, that they should avoid over-stimulation of the nervous system from any causes and particularly from sex excitement. These people do not bear well the repeated experience of having the sex emotions stimulated without the opportunity for the expression of these emotions in a manner to afford gratification.

In most cases I have found that these nervous breakdowns come as a result of hereditary predisposition, together with a combination of causes, often embracing sexual disturbances and nervous abuse, so that it is difficult to say just which single factor was the major element in the production of the breakdown.

Prevention. The real time to help these people is when they are in the cradle. Parents should early teach these children thoroughgoing self-control, raise them to learn to go about their business independent of their emotional whims or their passing neurotic feeling of fatigue, and help them early to learn to make decisions, to settle things, and then to settle it that they are settled. In this way much of the tendency by heredity toward nervousness could be overcome before the child reaches puberty. These are the babies that must be put to bed and if they want to cry, let them cry it out. They must not be rocked to sleep each night. The great trouble with this sort of discipline is that the mother is often neurotic and needs someone to come into the home and train both herself and her babe. It goes without saying that neurotic children or adults, for that matter, need good hygienic surroundings in general, fresh air, out-of-door life, good food, abundance of rest, and proper hygienic bathing practices.

We can best prevent nervousness in the adult by training the child to play the game, to take defeat joyfully, to be cheerful in the presence of disappointment; to take correction without sulking; to have his way crossed without indulging in an emotional sprawl. These are the children that need to be raised with a sense of duty to the world and to practice unselfishness in the home, and self-denial with respect to their playmates and companions. Responsibility should be early incul-

cated and they should not be allowed to brood over fancied slights and to develop undue sensitiveness. They should be made to play, to engage in competitive games and in this way learn how to take defeat and adjust themselves to petty failures.

In the case of older children, however, the more fierce athletic competitions are not desirable as they take them too seriously. They would be over-stressed and strained in the game and they are liable to be downcast in the presence of defeat. Individuals of this type are prone to make work out of their play.

Youth belonging to this class grow up and always do better in the country where there is less excitement than in the city. Amidst rural surroundings they have better opportunity for self-expression and social contact with their fellows. Certain types of youth who are highly sexed and somewhat morbid in this respect often do well if they are put in segregated educational institutions. On the whole, I believe co-education is a helpful, healthful experience for young men and women, but in the case of certain over-sexed neurasthenics, they do better if they are in schools where they freely mingle and intimately associate only with their own sex.

Training and guidance. Much can be done to prevent a subsequent lapse to semi-invalidism by choosing a proper career, and a life plan must be formulated which will provide for out-of-door recreation and from eight to ten hours' sleep every night. These are the people that should use neither alcohol nor tobacco. The tendency to use drugs, narcotics and stimulants, must be watched carefully from the very fact that they suffer from habitual fatigue, that they are constantly bored with a worn-out, run-down feeling—for these very reasons they are the persons who are especially tempted to resort to stimulants and bracers of various sorts ranging from coca-cola and bromo caffein up to alcohol and cocain. These people are even harmed in many cases by the use of tea and coffee.

These neurotic people after marriage present new problems. The responsibility of a home, the business career, is sometimes too much for the man, and he threatens to succumb to the pressure. The wise counsel of an experienced physician at such times is invaluable. The doctor will plan to modify the work but keep his patient on the job. Long vacations, trips around the world, three months in California, do these people

no good. Likewise in the case of a married woman, the fears and anxieties of pregnancy, the responsibilities of raising children, often demand the counsel of a wise physician to help her face these responsibilities without bringing on a nervous collapse.

It is a question all the way through of discipline, self-control, better self-understanding; the proper adjustment of the demands of life to one's inherent capacity for endurance and sustained effort; the training of nervous individuals to do things today. We must get rid of the characteristic tendency never to do anything today that can be put off until tomorrow.

Of course, to the onlooker all this nerve business seems nonsense, utterly foolish, but it is not to the neurotic sufferer. It is all intensely real. These unfortunates suffer just as much as some other person would with a toothache or a boil. While imaginary disease is not real, a diseased imagination is one of the realest things in the world.

These nervous sufferers may get into the habit of being in pain or chronic misery. Their threshold for the recognition of pain may indeed become so lowered, so enormously depressed, that the ordinary and normal sensations of physiologic life passing over their nerves may be so recognized as pain and may be the occasion of actual suffering on the part of these unfortunate creatures. That is, nervous patients can get in that perverted and abnormal state of mind and body where they will recognize the sensations which the most of us regard with pleasure and look upon as normal—I say, where they will recognize these same normal sensations as a source of suffering, as bona fide miseries of the body, sometimes even insisting that they are actually painful. It is quite easy for these sufferers to take from one to two hours, whenever occasion offers itself, to tell their friends or their physician the story of their sufferings in the minutest detail. It becomes a habit with them, a mania, and this has no doubt led to the unfeeling pleasantry that some of these unfortunates actually come to the place where they "enjoy poor health."

Emotional elimination. The emotional life of these nervous sufferers must be active and fairly well balanced. That is they must enjoy the emotion of ambition, the satisfaction of achievement. They must enjoy work. Nervous people must learn to like their job or else get rid of it, and get one they do like.

They must be regular and systematic in their play—come to enjoy recreation; to learn how to relax. In fact, it is an excellent thing if they can have a fad of some sort. They should look for a hobby. They should also have an emotional outlet in the direction of religion and spiritual things, together with artistic enjoyment—music and art, nature study, anything along the line that will expand the mind and get the patient away from introspection, spying on one's self; and in accordance with the patient's situation, the proper outlet in a social way for the emotions, including association with the opposite sex and the proper management of problems of individual sex hygiene.

In general, remember that it is the work cure and not the rest cure these nervous patients need.

PSYCHASTHENIA

The psychasthenes are those who suffer from inherited neurasthenia—true brain-fag. They are the people who are "born tired," and are never really able to get over it. I believe that the number of psychasthenes in our population is steadily increasing. Psychasthenia is not, in many ways, so easy to get away from or cure, and it represents the misbehavior of a nervous system that will remain more or less psychasthenic throughout one's lifetime.

The psychasthenic's symptoms are more truly mental than are those of the neurasthenic. The psychasthene usually complains of being fatigued or worn out, since 15 or 16 years of age, though he may be otherwise in a state of excellent health. The psychasthenes do not have to have stress and strain or sickness to bring on their trouble—it just comes on naturally, just like water runs downhill. In many ways they behave, and react to their environment, like a child would, unless the occasion is really one that demands large thinking and big action; then, as a rule, they meet it bravely, for the time being forget their troubles, but relapse back into a state of complaining and fatigue as soon as the crisis is past.

Psychasthenia is a true inheritance of racial stock; it is a part of our ancestry, a sort of defect in hereditary evolution, and therefore overtakes us without will or leave. Our personal responsibility is only concerned in and with those methods and measures which, on the one hand tend to make the situation worse, or, on the other, assist in overcoming

nature's handicap, thus enabling the psychasthenic victim to make a creditable showing with an otherwise abnormal mechanism and a greatly curtailed nervous capital.

Symptoms. Many of these individuals who are born tired, if they are raised in the country or amidst rural surroundings, do very well and make good in life. They do not do so well in the swift channels of commerce and society which characterize the larger cities. There they are more likely to break down, "go wrong," or "blow up." It is quite largely from the psychasthenes of the nation that the ne'er-do-wells of modern society are recruited. The majority of our inveterate and incurable tramps are afflicted with this psychasthenic taint, as are also those scions of certain aristocratic and wealthy families who are now and then so strikingly attacked with the wanderlust. So it would really seem that this term "psychasthenia" might be pressed into service for the purpose of courteously describing a certain stratum of modern society which might otherwise commonly and vulgarly be called "lazy."

The psychasthene's chief trouble, after all, is not merely the ever-present and pressing fatigue, but also a general incapacity for doing things, coupled with the everlasting habit of over-attention to everything connected with his thinking, living, feeling, and working. The psychasthene spends the larger part of his mental effort and nervous energy in watching himself and otherwise trying to help himself in carrying on these varied mental and physical processes which nature intended to be automatically executed. Thus his nervous energy is almost wholly consumed on himself, in a useless and thoroughly harmful manner. In other words, the psychasthene is chronically guilty of "spying on himself." He cannot let his mind think or his stomach work without watching it. He is even guilty of trying to watch himself go to sleep, which of course never fails to spell insomnia.

Prevention. But it is surprising what education and training, development of decision and improvement of will-power will do for some of these psychasthenic patients. They learn to forget their ever-present fatigue and their nervous sensations. They are able to train themselves to go about their business and to come just about doing a real man's or a real woman's work in the world, so that after all some of them turn out to be very efficient workers, and to be quite happy and contented with their lot. The majority of them are really

able to master the art of living with themselves as they are and the world as it is.

HYSTERIA

Our utter carelessness and indifference as to who marries in this country, is not only contributing to an increase in our markedly defective stock, but is also leading to an undoubted increase in all of the lesser forms of nervousness, including hysteria. And what is hysteria? The answer is difficult. In olden times it was called demonical possession, witchcraft, and what not. Hysteria, as a disease or a nervous disorder, must not be confused with mere hysterics. Most nervous, uncontrolled, neurasthenic individuals may get hysterical at times, but this would not warrant a diagnosis of hysteria.

The older physicians were tempted to look upon hysteria as a malady that was largely feigned; as a fictitious sort of disease performance on the part of certain sorts of nervous and emotional women. Men were not supposed to have the disorder unless they were somewhat effeminate. Doctors disagree as to what hysteria really is, but I have come to look upon it as a sort of hereditary deficiency in nervous self-control; at least the tendency is hereditary. It is a mild disorder of personality and occurs in those individuals who are, by heredity, highly suggestible, on the one hand and who possess, a small degree of self-control on the other. It is something more than neurasthenia, it is more deeply rooted than the mere nervous disorders. It comes nearer being a part of one's real temperament and personality. There seems to be at times a real mental insufficiency, which results in the sympathetic nervous system engaging in various wild and sort of runaway performances affecting various parts of the body and the patient's general behavior. During these attacks the disorder manifests itself by producing many and diverse symptoms, and is able in one way or another to impersonate almost every known form of human illness. And of course it is true that an uncontrolled imagination often plays a large and important part in the manifestations of this perplexing disorder.

Hysteria is, then, briefly summarized, a nervous disorder occurring chiefly in women, characterized by lack of control over the emotions and certain physical acts, by morbid self-consciousness, by exaggeration of all sensory impressions, and by extraordinary ability to simulate the symptoms of numer-

ous diseases, and thus to impersonate a host of minor and major physical disorders.

Hereditary nature. Hysteria, whether it is the phenomenon of the imagination playing the rôle of the actor; whether it is partial dissociation of ideas, deranged nervous control, or disturbances of personality; whether it is temporary insanity of the sympathetic nervous system, or what not; it is certainly a disorder that is largely hereditary. Whatever the causes of stress and strain, nervous tension, anxiety or worry, or whatever the bodily habits or physical vices which may directly or indirectly contribute to the outbreaks, attacks, or spells of hysteria, the fundamental and underlying fact remains—the disease is hereditary and is certainly transmissible in some form or other to the next generation.

While it is true that neurasthenia, psychasthenia, and hysteria probably do not tend to go down the line with the same unerring accuracy as do feeble-mindedness and insanity, nevertheless when two individuals who are highly neurotic marry it is common observation that the majority of their children are almost equally neurotic or more so. Now when these neurotic persons are mated with normal or nervously superior individuals, there usually occurs great improvement in the majority of the offspring. So we are encouraged by the fact, or by the belief, at least, that these less serious nervous disorders have a tendency to "breed out" of the stock rather than to increase in intensity and severity with successive matings. Many of these nervous traits seems to behave after the fashion of Mendelian recessions. This fact probably explains why we are not cursed with more defectives of the nervous sort, in view of our utter indifference to improvement of our marriage laws and other eugenic precepts. But, notwithstanding these favorable features regarding the inheritance of these disorders, it is the common belief of physicians and specialists who handle these troubles that they are considerably on the increase in America at the present time.

Symptoms. The symptoms of hysteria are too many and varied to catalogue. As has been intimated, these patients can simulate the manifestations of almost any and every known disease, ranging from a fit of bad temper to complete unconsciousness or catalepsy, on the mental and nervous side; and from simple perversion of skin sensation down through headache and all sorts of pain to apparent appendicitis and gall-

stone colic on the physical side. And in many cases, in connection with the periodical manifestations of this disorder, there is to be found more or less emotional repression, lack of adequate self-expression. Many cases of hysteria are also associated with some conscious or subconscious sex disorder—sex repression. In most instances where the sex element enters into the causation of hysteria or other forms of nervousness, the victims are more or less unconscious of the presence of this factor.

INSANITY

In general, the task of preventing insanity differs little from that of preventing nervousness. A given stress or strain will in one case result in a nervous breakdown and in another case in insanity, and this is largely due to the hereditary tendency of the two individuals. In one case there was merely a constitutional inferiority which had been inherited and nervous breakdown resulted; and in the other case, there was a more definite tendency to insanity and therefore the stress or strain resulted in some form of dementia.

Authorities estimate that anywhere from 50 to 75 per cent of insanity is due in the last analysis to inherited mental defects. The tendency is in the stock. It is a family trait.

Now there are other causes beside heredity that may lead to insanity. Mental derangement often follows typhoid fever, influenza, and other diseases, including meningitis. In childhood convulsions and epilepsy may be initiated by infections such as scarlet fever and other disorders.

Outside of heredity the two great causes of insanity are alcohol and syphilis, though other drugs, morphin and cocain, come in for their share. It is apparent that some of this insanity is preventable, if we could prevent predisposed individuals from the abuse of drugs on the one hand, and the contraction of syphilis on the other, or to see that cases of syphilis are more thoroughly treated and cured. We must come to know that softening of the brain is in practically all instances merely syphilis of the brain; that locomotor ataxia is syphilis of the spinal cord.

Insanity is prone to develop at certain periods of life, particularly around the age of puberty, that is twelve to fifteen years, and in connection with pregnancy and childbirth in the case of women, and more particularly at the change of

life, somewhere from forty-five to fifty-five years of age. While in the case of men insanity seems more prone to appear in middle life, somewhere between thirty-five and fifty years.

Forms of insanity. One of the most common forms of mental breakdown is that which occurs early in life and is known as *dementia præcox.* In fact this form of mental trouble is so common that it constitutes about 40 per cent of the inmates of our insane asylums. There is not a great deal that can be done to prevent the appearance of this form of insanity except in the case of individuals who act peculiarly and who are very slow about eating, dressing, and doing other things—they should be put in a place where there will be a minimum of stress and strain on the mind and nerves and where they will not be bothered with worries and anxieties, and they should be kept busy with light work, recreation, reading, and other employment so that they will not fall into the habit of brooding over themselves. No doubt much can be done toward the prevention of this disease if we understand more about these tendencies and appreciate the importance of providing for these patients an even tempered life, free from emotional stress, mental anxiety, and physical strain. It goes without saying that these patients do much better in the country and smaller towns than they do in the large cities. Let them move to the city and they promptly "blow up." The disease manifests itself full-fledgedly, and they are sent to the asylum.

Another form of insanity is *paranoia.* These people seem to have good minds and even when they have committed a crime they are often so clever as to escape being sent to an institution for the insane, as their minds often seem to be quite clear except on some one point. Even when these people are sent to institutes for the insane, if they have money they are usually able to get out, as they are fairly sane when examined on all points except that particular topic which constitutes their mania. These paranoiacs always imagine they have been persecuted, deprived of their property, or that someone is alienating the affections of their wives and fiancées, and this explains their sudden and murderous assault upon their fancied enemies. They are the children that in school, although they were bright, were opinionated, egotistic, highly suspicious, and in other ways morbid. Sometimes these paranoiacs play the rôle of prophets, establishing new religions and become the

ready instruments for use in political upheavals, revolutions, strikes, and other social disturbances.

We have another large group of insane which are put in the class of *maniac-depressive* insanity. These people swing in cycles from the destructive, noisy, violent type, to the depressed, melancholic form of dementia. At one time they are restless, violent, and destroying the household furnishings; at other times they sit quietly for days at a time, if they are not disturbed, holding their heads in their hands and contemplating the thought that they have committed the unpardonable sin. At other times they walk back and forth like a caged beast, wringing their hands, all the while groaning and moaning over their troubles, real or fancied. It is this type that has the tendency to commit suicide. This type sometimes recover and are allowed to go home and reproduce themselves and then go back to the asylum. More than a quarter of the people admitted to our asylums each year have been there from one to one-half dozen times previously.

Another form of insanity is *senile dementia*, the mental trouble of the aged, which comes on as the result of changes in the blood vessels and cells of the brain. There is little we can do to prevent this, except to avoid those habits or practices which lead to arterial degeneration—premature old age.

When we stop to think that we have in the country more than one-quarter of a million insane; that insanity seems to be increasing faster than the population; that the epileptics and mental defectives are three-quarters of a million; it is certainly time to awaken to the necessity of doing something to check these serious disorders. Almost 1 per cent of our population is mentally defective at the present time and should be confined in suitable institutions, while eugenic authorities estimate that 10 per cent of our population is so defective that it should not be allowed to reproduce itself.

Prevention. When it comes to the prevention of feeble-mindedness—moronism—we are forced to recognize that since these conditons are largely hereditary, that their prevention consists in the control of the mating of the defective individuals.

It seems that sterilization and segregation are the only means at our disposal for preventing the rapid multiplication of these insane and defective individuals who are such a menace to society and such an expense to the normal-minded citizen who

must pay the taxes to support this great "aristocracy of the unfit."

Segregation is not possible, except in about 25 per cent of defectives, because the law does not deprive a person of liberty unless dangerous to others. Vasectomy in the male, or removal of part of the vessels leading from the testicles; and salipingectomy or the same operation on the tubes leading from the ovaries in the female, are simple, sure and safe operations, and do not in any way interfere with the sex life of the person operated on—they only deprive the individual of the power to reproduce. Laws have been passed in some states legalizing sterilization of mental defectives. These operations should be universally performed under the supervision of properly appointed boards; and only by such drastic methods can the present alarming increase in idiots, imbeciles and the insane be stopped.

CHAPTER XLVIII

HOME SANITATION

It is not only important properly to plan for the erection of a home that will be well lighted, well ventilated, and otherwise sanitary, but it is equally necessary to give proper attention to the building site.

Probably the ideal building site would be an absolutely impervious soil, such as a solid rock, but as such sites are comparatively rare, the next best soil for a building site would be a porous earth formation, such as would be represented by layers of sand and gravel comparatively near the surface. Next in value would be the various forms of loam, while the most undesirable building sites are those in which the subsoil is largely composed of clay. Building sites with a clay sub-soil nearly always hold a large amount of water, thus increasing the dampness about the house, unless such locations are thoroughly tiled, or otherwise perfectly drained.

HYGIENE OF THE SOIL

In regard to the relation of soil to health, Rosenau says:

> The soil was formerly accused of being one of the largest and most important factors in the spread of the communicable diseases. It was once regarded as the cause, if not the nesting place, of infections of all kinds; tuberculosis, malaria, typhoid fever, plague, yellow fever, cholera, dysentery, and many other diseases were directly associated with the soil. We now know that comparatively few of the micro-organisms pathogenic for man live in the soil.

A soil polluted with human excrement presents the possibility of danger of intestinal infections of all kinds. Thus bacterial infections such as typhoid, cholera, and dysentery, or protozoal infections, such as amebic dysentery, or the higher worms, such as hookworms, may all more or less be associated with polluted soils.

Soils containing much organic matter and presenting other favorable conditions afford resting and nesting places for a number of insects, such as flies, ticks, etc., which may carry

infections. Vegetables grown in polluted soils may transfer bacteria, protozoa, or the eggs of worms in a mechanical way from the ground to the mouth. This applies particularly to vegetables eaten raw, such as radishes, lettuce, etc.

Practically all the water used for drinking and other purposes has either rested upon the soil or has percolated through it into the ground. The soil materially affects the character of the water. In this way the soil indirectly influences health variously and sometimes seriously.

DANGEROUS SOIL INFECTION

The soil is literally swarming with microbes, containing as high as 100,000 little colonies or groups per cubic centimeter in virgin earth.

The soil may contain various bacteria found in connection with animal and vegetable decay, as well as the eggs of various worms which grow in the human intestine; but the most formidable and dangerous of the "soil germs" are the microbes of tetanus (lockjaw) and malignant edema, a rare but pernicious malady. These deadly germs thrive in the soil because of the fact that they grow without oxygen—air kills them—and this is exactly why the doctor insists on "keeping the wound open" in case of rusty nail injuries on the feet, and firecracker or toy pistol injuries about the dirty and germ-laden hands of the small boy hurt at his Fourth of July celebration. The lockjaw germ can't grow if air is present. The following summary includes the more dangerous soil infections:

1. *Tetanus.* Spores of the tetanus bacillus are found in the soil of most inhabited regions, not only in the superficial layers, but often at a depth of three or four feet. These germs are normally found in the intestines of the herbivorous animals—although they are also found in the intestinal contents of man and other animals. "Certain savages in the New Hebrides used to smear their arrow heads with dirt from crab holes in the swamp, which they knew by experience to be poisonous. We now know that this material contained tetanus spores."

2. *Anthrax.* Like tetanus, anthrax does not grow in the soil under natural conditions. Its persistence is accounted for by its resistant spores. Anthrax spores have been found in pastures where infected animals have been confined.

3. *Malignant edema.* The bacillus of malignant edema is

found widely distributed in the superficial layers of the soil. This organism is also found in putrefying substances, in foul water, and in the intestinal tract of various animals. It causes extensive hemorrhagic edema and is usually produced by deep punctured or lacerated wounds.

4. *Typhoid fever.* Typhoid bacilli frequently find their way upon and into the soil along with human excreta. Multiplication, however, rarely takes place there. "As a rule, the typhoid bacillus scarcely lives a month, possibly two or three weeks, in the soil. When frozen they may live and remain virulent for several months."

5. *Hookworm disease.* Hookworm disease is closely associated with the soil. It may fairly be considered an infection, the result of soil pollution. It occurs especially in moist and sandy soils rather than on clay or rocky soils. This is due to the fact that hookworm eggs, when deposited in fecal matter, soon dry up and die upon hard rocky or clay surfaces, whereas, they find favorable conditions for development upon most sand or loam.

6. *Other animal parasites.* In a somewhat similar sense many of the animal parasites of man are deposited on the soil and reinfect man during one of the stages of their cycle of development. Most of the intestinal parasites or common worms of man are deposited on the soil, and after a varying journey, sometimes through an intermediate host, again find lodgment in man. In the case of trichina, for instance, man pollutes the soil with feces containing the eggs. Hogs devour this infection and return the disease to man. In a somewhat similar way, the tapeworm of cattle and also some ameba pass part of their history upon the soil.

GROUND AIR AND WATER

Most everyone knows that deposits of water are sometimes to be found quite near the surface, and are commonly known as "ground water," but it is not as generally known that all forms of soil, even the hardest and most compact, contain a great deal of air. The loose gravelly soils and sub-soils always contain a large amount of air, and usually harbor more or less water.

As the water gradually sinks into the soil after a heavy rain, more or less air is drawn into the porous soil, by the sinking of the water. Another heavy rain will serve to raise the level

of the ground water and thus to crowd out an equal amount of this "ground air." The height of the ground water and its variations from time to time may be quite accurately determined by the depth of the water in the neighboring wells, which usually rises and falls with the rise and fall of the ground water.

The blowing of a strong wind against one side of a small hill, or eminence of ground, probably serves to force out some ground air on the opposite side of the knoll.

While most of us are more or less awake to the dangers of ground water, the inhabitants of country homes and rural communities perhaps do not always fully appreciate the health dangers associated with ground air. While carbonic acid gas (CO_2) is present in considerable quantities, it is not, in all probability, the really dangerous element of ground air. The unwholesome factors of such air are probably to be found in other gases, the product of organic decomposition in the soil and subsoil, and which are washed down into the soil in connection with every heavy rainfall.

Rain water from the roof should not be allowed to run into the ground near the house, nor should it be allowed to stand even a few hours in any receptacle which can be entered by insects for the purpose of depositing their eggs. Looking out for this matter will save much trouble with mosquitoes later on. Kitchen slops should not be thrown out to draw flies, but should go to fertilize the garden. By all means have a garden, two of them, vegetable and flower, one for you to dig and hoe in, and the other for the wife and children to raise beautiful flowers in.

THE WATER SUPPLY

It seems necessary to say little regarding water supply in view of our remarks in a former chapter concerning the importance of pure water. Whether the source of supply is a well, a spring, a lake, or a stream, is a matter of comparative indifference so long as it is pure and reasonably soft. Spring water justly stands high as a source of water supply, and yet the mere accident of its coming to the surface of the ground does not necessarily give it superiority over well water.

In the country the dangers from sewage contamination of shallow well water should always be borne in mind. If drinking water is stored in cisterns, these should be made of slate

or galvanized iron, and on no account of lead, for certain fear of lead poisoning. The cistern should have no connection with water closet or drain; it is important that it be emptied and scrubbed at least twice a year. Good water is clear, colorless, tasteless, and odorless, and if it is of suspicious quality, a report should be sent to the proper health authorities, so that, if necessary, an analysis of it may be made.

"A family living in a home favorably located and properly constructed, and provided with an ample supply of pure air, pure water, and suitable food, with proper clothing, and such advantages for mental and moral culture as most civilized communities afford, ought to be both healthy and happy." The doctor will rarely need to visit such a home in his professional capacity, and disease will long fail to make any successful attack upon such a happy home circle.

BARN YARDS AND HEN COOPS

In the country and the smaller towns, it is often the custom to have the barn yard with its hen coops and hog pens in close proximity to the house. In some European countries they even house people and animals all under one roof, the barn being merely the back part or sub-basement of the house. The decaying filth and animal excreta connected with the barn yard is not conducive to the health of human beings.

Various forms of dysentery, to say nothing of the eggs of numerous worms, may be introduced into the system as the result of having these animal abodes too near the human dwelling. These dangers of disease are always increased when a dug well, especially if it is shallow, is located in or near the barn yard. Such wells are contaminated, not so much as was formerly supposed by the water veins running down from the barn yard door to the well, as from the surface drainage at the mouth of the well and from the washing of filth and microbes off the feet of the farm hands while standing at the pump, as the soil on the platform surrounding the well is uniformly sloppy, muddy, and filthy.

It is, in every way, advisable that the well should be as far away from the barn yard as possible, and it is to be hoped that in the future, the house will be built on the higher site so that we shall not see what is so common today, namely: the barn occupying the higher and more ideal building site, draining its filthy waters down hill toward the dwelling.

In planning the dwellings of the future, let us arrange to keep animals, not excepting the dogs and cats, as far away from our own dwelling as possible, consistent with reasonable convenience and the land at our disposal.

WALL PAPER

Many cases of poisoning, some fatal, have been traced to the use of wall papers, the colors of which contained arsenic. Window curtains and paper boxes have become sources of poisoning in the same way. The color of wall paper, which most frequently contains arsenic, is green, although many other colors have been found to be contaminated in the same manner. It is almost impossible to find a green enameled paper which does not contain arsenic. The arsenical poison is dispersed through the air in the form of fine dust which is separated from the paper by rubbing of garments, swinging of picture frames, and in various other ways. Green window shades, containing arsenic, are particularly dangerous, as the frequent rolling and unrolling of the curtain communicates a large quantity of the poison to the air.

It is believed also that the poison of wall paper may be communicated to the air through the fermentation of the material used in attaching the paper to the wall, which decomposes the arsenical compound in the paint, producing sulphureted hydrogen, an exceedingly unwholesome gas. This is especially likely to occur when new paper is put on without removing the old, a practice which cannot be too severely condemned. We have seen walls upon which there were from four to eight layers of this arsenical wall paper. Green wrapping paper, even that used in wrapping candies, has also been found to contain arsenic. It may be said that, in general, it is wise to avoid green colors altogether.

It is very easy to test wall paper before buying, and it would be wise to take the precaution to do so in all cases. The following is the most simple manner of testing it:

Place a small piece of the paper—say two or three square inches—in a saucer, and pour over it strong ammonia water. After leaving it to stand five or ten minutes, turn off the ammonia to one side, and drop into it one or two crystals of nitrate of silver. If arsenic is present, little yellow particles of arsenic of silver will soon make their appearance on the crystals of nitrate of silver.

CHAPTER XLIX

SEWAGE AND SEWAGE DISPOSAL

Do not allow piles of rubbish, waste paper, and tin cans to accumulate in some corner of the back yard. The old fashioned rubbish pile is a source of unwholesome gases and noxious odors, as well as a breeding ground for insects, flies, and mosquitoes. The rubbish pile and the manure heap are institutions that should have long since ceased to exist. They are incompatible with our present day knowledge respecting the breeding of the michievous house fly, and its equally undesirable cousin, the mosquito. It is entirely permissible to set aside a corner in the back yard where refuse and discarded rubbish may be promptly and thoroughly burned.

The science of plumbing has become so well developed, in recent years, and is so well carried on, as a rule, by licensed mechanics belonging to this order in the larger cities, that it seems hardly worth while—in a book of this character—to offer detailed suggestions regarding proper plumbing.

It should be remembered, however, in this connection, that most of the disagreeable odors and foul smells which come from plumbing fixtures, are not due at all to sewer gas, but come from decomposing organic matter and soapy residue within the pipes, the traps, or around the fixtures themselves, and that proper cleaning will soon serve to sweeten up the premises.

DRAINS AND CESSPOOLS

Sometimes poorly arranged drains, improper sewer connections, nearby cesspools, and neglected catch basins are the source of unwelcome odors and unwholesome gases, but we are not nearly so afraid of sewer gas as we used to be. We have learned that the mosquitoes, which breed in the kitchen drains or the rain barrel at the corner of the house, are far more dangerous and deadly than all the sewer gases which may be found in the main sewer of a great city; but while we are overcoming our fears of sewer gas, we are becoming more and

more fearful of the disease germs which grow and multiply in defective sinks, drains, and traps.

Where cesspools are necessary to the proper disposal of kitchen wastes and other refuse, they should be placed some distance from the house. If they are properly cleaned from time to time and the plumbing connections all possess a letter S water trap, which is constantly kept filled with water, there will be little danger of odors and gases escaping into the house. Cesspools, however, should not be located near wells used for drinking water. In sandy soils the danger of bacterial contamination is small if the distance is more than 25 feet, but, even so, the idea of infiltration of sewage into a well is repugnant, and often the water may be so tainted as to have a disagreeable odor, even when analysis shows it to be bacterially safe.

The disposal of the contents of cesspools is one of the most troublesome questions connected with all forms of sewage disposal. The common method is to spread it upon the land as a top dressing. This is apt to be done in the winter when other farm work is slack, and not infrequently when the ground is frozen. "Thus opportunity is given for fecal bacteria of human origin to be washed into a well or some public water supply. If spread on the ground during the summer, flies have access to it." A new cesspool should be dug once a year, or the old one thoroughly cleaned.

It is a good plan to sweeten up and disinfect all sinks every few weeks with a little kerosene, or with the use of a copper solution which is made by dissolving a pint of copperas in a gallon of water.

In many cities the sewers are ventilated by allowing a free flow of air from the sewers through the house drains, the individual house fixtures only being trapped. This method is apparently safe, provided the plumbing is of a substantial character. If it is not, it is better to place a trap upon the main house drain. It is believed that in the future plumbing will develop along the lines of simplicity and improved quality of materials and work, and that the present complicated system of traps and vents will be abandoned.

The catch-basins, through which the street wash enters the sewers, are trapped against the egress of sewer air. The water that stands in them is a prolific breeding place for mosquitoes. Unless catch-basins are frequently cleaned, the accumulating

organic matter putrefies and the odor from it may be worse than that of the air of the sewer. Catch-basins of this sort are being omitted from some of the best designed modern sewage systems.

COUNTRY CLOSETS

In this connection let us emphasize the importarce of carefully and thoroughly screening all privy vaults and outhouses in the smaller towns and country places where no sewer system is in use. This is imperative, in order to prevent the spread of dysentery and summer bowel disorders by means of flies. This matter will some day be taken seriously, and will be vigorously enforced by the local health authorities. The disease-laden contents of the vault are not exposed to the sterilizing action of the sun's rays, and must, therefore, be seriously regarded as a menace to health.

In the country, as well as in small towns and villages, where sewer connections are not available, the "dry earth" system can be used. Gather up a box or barrel of dry pulverized dust from the public highway. The dust from the wheel ruts is the best, being finely pulverized. A good supply should be procured during the dry weather so as to have plenty on hand in case of rain and for the winter. These boxes of dust may be conveniently placed in the closet and by means of a small fire shovel, a quantity of this dry earth is sprinkled into the vault several times a day and in this way all odors are destroyed. And even in the case of unscreened vaults, the flies are largely prevented from gaining access to infected material by this simple precaution.

In the winter time, the old-fashioned out-of-doors closets of the rural communities should be discarded and an indoor dry earth pail closet be substituted. It is a crime to compel women, invalids and children to endure the exposure attendant upon the use of an outdoor closet in zero weather. These outdoor closets were responsible for much winter pneumonia and neuralgia in past generations, as well as being responsible for much typhoid fever, diarrhea, and dysentery in connection with the house fly during the summer season.

SEWAGE DISPOSAL

Of all the problems of domestic hygiene and public sanitation, sewage disposal is one of the most difficult of solution.

One of the older methods of disposal consisted in spreading it out upon the land as fertilizer, but there are serious objections to this method, as human excreta may carry the eggs of numerous worms which subsequently contaminate such vegetables as celery, lettuce, and radishes, which when eaten raw serve to transmit these infections on to other human beings.

The only sanitary method of disposing of the contents of cesspools is by burial, or by the more modern methods of scientific disinfection, as carried out by the sewage disposal procedures of the larger cities.

It is particularly objectionable in the south, where hookworm disease prevails, to scatter sewage over the surface of the ground, while the danger of spreading disease by means of flies is even greater in the south because of the longer warm season.

Still more difficult, when it comes to sewage disposal, is the problem of the summer hotel, the mountain camp, or the transient labor camp connected with the railroads or other construction projects. In connection with some of these, as in the case of the army, the recent practice has been to undertake the cremation of the sewage. While not, as a general rule, employed now as in past years, the dry earth system is still made use of in certain rural districts.

In smaller communities which do not have a modern sewer system, it is becoming more the practice to collect sewage in vaults which are so tightly constructed as to be inaccessible to flies, insects, rats, etc., which, of course, implies that all doors and ventilating windows are properly screened. Such vaults are usually constructed of concrete. The danger of privy vaults contaminating water supply, in case they are not watertight, depends entirely upon the proximity of wells and the nature of the intervening soil. In the case of sandy or clay soils, it is desirable to have the privy vaults at least fifty feet away from the well, and in the case of limestone soils, where crevices in the rock are likely to be present, one hundred feet would be a minimum distance, while a mile or more would be better. Such problems are best handled by abandoning and filling up the old-fashioned dug well, and using water only from driven wells.

In even the smallest communities, it will prove, in the end, the better economy to provide a modern sewer system which will not only afford the comforts of indoor toilet facilities, but

will also provide the advantages of proper and sanitary disposal of sewage, thereby lessening the sorrow and expense of infections, sickness and untimely death, which are always connected with inefficient and insanitary sewage disposal.

The modern methods of treating and disposing of sewage by means of septic tanks, activated sludge, etc., are highly efficient, but a knowledge of their details is of little value to the individual layman except that he should appreciate the importance of these newer methods of sewage disposal, and, as a voter, should always be ready to provide proper funds for the health authorities in their efforts to provide his community with up-to-date facilities for proper sewage disposal.

Railway sewage. Let us suppose a case by no means out of the ordinary; an individual starting on a transcontinental tour, afflicted with some form of dysentery or some other diarrheal disease or perhaps in the earlier stages of typhoid fever, boards a train. The nature of the disease is such as to produce frequent bowel action for several days. In this way, a single patient whisked across the country by the limited express, more or less infects the entire length of this highway of travel. Within a few days these infectious bowel discharges have become more or less dried and, in the form of dust, are easily whisked up by passing trains to be inhaled by the passengers or deposited upon drinking cups or the food and dishes of the dining car, to be subsequently eaten. The only reason infections from this cause are not greater, is probably due to the sterilizing powers of the direct rays of the sun, which kill large numbers of the disease microbes.

GARBAGE DISPOSAL

The garbage dump of even a small community can easily become a great sanitary menace. In this connection it may be well briefly to discuss the different methods of garbage disposal.

1. *Garbage dumps.* While this is the most frequent method of disposing of garbage, it has the least to commend it. Little attention need be paid to the argument that it serves to fill up low places and thus prevents the accumulation of water and the breeding of mosquitoes. At least that is a far-fetched and lame argument. Of course this is not true, applied to dirt, cinders and wrecking rubbish. They are all of use in filling up low places. But we are speaking now, more particularly, of

raw garbage. These public dumps are breeding places for flies, and no plan of covering the dumps with fresh earth or using disinfectants has ever proved satisfactory. If dumps are to be employed, as they will be for some time in the smaller villages, they should be as far away from human dwellings as possible, as flies rarely travel over four or five hundred feet from their breeding places.

2. *Garbage reduction.* About the only things of value to be obtained in sorting garbage are the cans and the bones. Otherwise, it does not pay to sort it. And of course any method of reduction requires that the garbage shall be kept separate, but the erection of reduction plants is very expensive, even though they may enable a community to meet all the expense of garbage collection and disposal when the plant is once in operation.

3. *Garbage destruction.* This is a method requiring not so much initial cost in the construction of the plant, but requires some expense for operation, since, as a rule, garbage will not burn itself. It requires several hundred pounds of coal to bring about the destruction of every ton of garbage. Of course, with this method the garbage is simply burned up, while by the reduction method fat is extracted which can be sold to soap factories, and fertilizer is produced by the residue. But cities of less than 150,000 will probably not be willing to spend the money to put in a modern reduction plant, and will, therefore, have to consider either destruction or some other method of disposal. Cities down to probably 25,000 will be able to finance a garbage destructor, and below that they will probably depend upon the less ideal garbage crematory method.

4. *The garbage crematory.* Individual crematories are provided for farms and dwellings in rural communities, and there are many things to be said in their favor, where community methods of disposal are not practiced.

5. *Garbage as fertilizer.* The method of spreading garbage out on the soil with the idea that it is a fertilizer is a great delusion. Raw garbage possesses very little fertilizing value. In fact it sometimes serves to practically ruin the soil for agricultural purposes—as commonly understood, it sours the soil.

6. *Feeding to hogs.* Probably the most valuable thing about garbage is its food value, and some cities like Denver, Colorado, maintain municipal hog pens for feeding their garbage, and have found that in this way it pays for both its collection and

and disposal. The difficulty of this method is to find suitable tracts of land near towns and cities where the harboring of the hogs will not, in itself, be a nuisance. Furthermore, unless the garbage is cooked, it is found that tuberculosis and cholera are highly prevalent among the garbage-fed hogs.

The disposal of garbage, when it comes to the individual home, depends of course upon its location. In the cities and some of the larger villages, some of the preceding methods will be practiced by the community as a whole. In the case of the farmer or isolated rural dweller, it is desirable that they should either burn their garbage or else bury it, and bury it deeply. For it has been found that fly larvae will hatch out and come up through four or five feet of soil to the surface.

CHAPTER L

HEATING PROBLEMS

Heating and ventilating the home go hand in hand. A large share of the cost of heating is chargeable to ventilation, hence if ventilation is overdone, it becomes an unnecessary expense. The artificial warming of houses has a similar action to clothing. "Burning fuel in the furnace saves fuel in the human machine." The problems of heating are directly connected with the prevention of numerous diseases.

HEATING ARRANGEMENTS

It is hardly worth while to discuss the old-fashioned method of heating by stoves—the objectionable features are so evident that stoves have long since been largely discarded in favor of various kinds of furnaces. Wherever they are still in use, however, great care must be exercised to prevent any chance of their pouring forth the deadly carbon monoxid, especially at night when the family is asleep. The only thing to be said in favor of stoves is that little of the heat produced was lost.

Furnaces, on the other hand, are usually wasteful because a large part of their heat is radiated into the cellar, which is the warmest part of the house. This can be obviated considerably by having the furnace and warm air pipes thickly covered with asbestos; also by having the cellar connected freely with the air space between double walls all around the house.

Of course, the same loss of heat occurs in furnaces which heat boilers for hot water or steam heating, but they have the advantage of not carrying dust directly into the rooms. On the other hand, they lack the advantage of introducing warm air fresh from outdoors, as the warm air furnace does. Besides that, unless you have a double system of steam pipes to bring and carry off steam, you are likely to be annoyed by cold radiators and by the banging of the steam in the pipes. Hot water heat is more quickly obtained but less intense.

These objections may be overcome by having the steam radiators in the cellar instead of in each room and passing air over and through them directly from outdoors and then through large pipes to each room. Sometimes the air is strained of dust by being passed through coarse cloth. This combination of steam and warm air is frequently used in large buildings and has the advantages of both systems, of both direct and indirect radiation. Any system of heating should be combined with some system of effective ventilation to carry off the impure air.

Whatever method of heating is employed, it will be found that in time the heat will shrink the woodwork badly unless the latter has been very thoroughly seasoned before building. So far as possible, the cracks and crevices thus formed should be filled up either with putty or cement or slivers of wood, otherwise they become permanent dust holes and germ nests.

METHODS OF HEATING

There are six main methods of heating in common use:

1. *Open fires.* The open fireplace heats mainly through direct radiation. It has the advantage of being cheerful and a good ventilator. It has the disadvantages of being wasteful and very unequal if depended upon as the chief source of heat.

Parkes and Kenwood estimate that, in an ordinary medium sized sitting room with an ordinary fire, from 10,000 to 15,000 cu. ft. of air are drawn up the chimney in an hour, the current being generally from 3 to 6 ft. a second. "As ventilating agents," say Notter and Firth, "the best types of open fireplace cause some 2,600 cu. ft. of air to pass up the flue per pound of coal consumed, or the passage of about 18,000 cu. ft. up the chimney per hour."

2. *Franklin stoves.* Franklin stoves consist of coal fires in a cast-iron stove, the products of combustion being carried off through a stovepipe. Such stoves, standing free in the room, are very efficient, so far as heating is concerned, and also favor ventilation through the circulation of air, which is drawn into the stove to support the burning of the fuel. The heating of the room is unequal, as it depends largely upon radiation and somewhat upon convection. Such stoves are apt to become red-hot, in which case it is believed they allow carbon monoxid to pass through the cast iron.

3. *Open gas heaters.* Open gas heaters without flues to carry off the products of combustion are bad, from a health

standpoint. These heaters consist of a series of metal tubes containing air or water, which are heated with naked flames. The heat is thus imparted to the room by convection and also by radiation.

Such devices may contaminate the air with carbon monoxid from leakage or from unconsumed gas, or from the formation of soot, which becomes incandescent. Such heaters also contaminate the room with CO_2 and other products of combustion. The "rubber" tube feeding these gas heaters often leaks, and there is frequently a perceptible odor of gas in rooms where these devices are used.

Open heaters burning oil are less objectionable than those using gas.

4. *Hot-air furnaces.* A hot-air furnace consists of a coal fire which heats a series of tubes or plates in the dome of the furnace. The air, which is usually taken from the outside through a duct, flows into this dome, where it comes in contact with very hot surfaces, and is thus conducted by thermal circulation through a series of ducts into the rooms of the house. A hot-air furnace of this kind constantly pumps fresh air into the house and is, therefore, a very efficient system of ventilation. "The objection to the hot-air furnace is that the air is excessively dry and frequently partly 'burned' in passing over the heated surfaces in the dome. The odor caused by the burning of the organic particles in the air may frequently be noticed in houses heated with a hot-air furnace." The heated air entering the rooms is usually allowed to escape as it will. In order to overcome the disadvantage of the dryness of the air furnished by the hot-air furnace, water pans are always provided, from which the water is supposed to evaporate.

5. *Hot-water and steam pipes.* This is a very simple and effective system of heating buildings. The hot water system is especially applicable to small buildings and steam pipes to large buildings. The hot water is more readily controllable than steam, which has a tendency to overheat. Special furnaces are found on the market to heat the water or to generate the steam, which then circulates through pipes to the rooms where wanted. If the hot-water radiators or steam coils are exposed directly in the room, the system is known as the "direct." In the indirect system the hot-water pipes or steam coils are placed in a special box where the air from the outside is heated, and this heated air flows by thermal circulation through ducts into

the rooms where wanted. In the direct system, the air of the room is simply heated and reheated over again, while in the direct-indirect system the fresh warmed air is constantly pumped into the building and it is, therefore, an efficient method of ventilation. In both these systems, the air is abnormally dried, just as it is in the hot-air furnace, though not to the same degree.

6. *Electric heating.* Electric heating is clean, easily regulated, but expensive. It has the disadvantage of being insufficient as a ventilating device unless special inlets and outlets are provided. Electric heaters consist simply of resistance coils which heat the room mainly through radiation and convection.

ROOM TEMPERATURES

The temperature of a room not equipped with fans should not be allowed to run over 70° F. When it is impossible to maintain a temperature below 72° F. conditions may be made fairly harmless by using fans enough to keep the air in active motion.

A bedroom should not be allowed to go over 60° F. and 55° F. would be better. An infant's sleeping room should be kept at about 65° F. until the child is three or four months old. The bedroom of an infant six to twelve months old can come down to 55° F.; after a year, 45° to 55° F.

Adults should preferably dress in a room 70° F. or a trifle higher.

A living or sitting room should be 65° to 70° F., according to the humidity. If the humidity is under 30 a temperature of 70° F. is required; if the humidity is 50 to 70 a temperature of 65° F. is in every way satisfactory. The same conditions apply to offices and schools.

Street cars should not be heated above 60° F. and a 55° F. temperature is better; day coaches and sleeping cars not above 65° F.

It will be noticed that the temperatures advised range from 45° to 75° F. There is a reason in each instance.

One of the few advantages of the open fireplace and stove heating is the lack of uniformity. Men and women who work in offices where the temperature is evenly maintained slow up and presently get sleepy. About once in so often they get headaches.

"The human body needs the stimulus which comes from having changes in temperature. This is one of the great advantages from having the room judiciously blown out from time to time. This, not overdone, will make everybody feel better, and the work will show the effect."

CHAPTER LI

HUMIDITY AND HEALTH

Water in its gaseous state is always present in the atmosphere, being one of the most variable of the normal constituents of air, and also one of the most important, on account of its influence upon health. As water vapor weighs only about three-fifths as much as air, dry air is heavier than moist air under equal conditions of temperature and pressure.

It is customary to speak of air "holding" water vapor. As a matter of fact, the air has nothing to do with it, for it should always be clearly observed that the presence of water vapor in any given space is quite independent of the presence or absence of air in the same space. The amount of water vapor which a given space contains depends entirely upon the temperature and not upon the presence or pressure of the air. At 32° F., for instance, the air can "hold" 1/160 of its weight of water vapor, at 59° F. 1/80 of its weight, at 86° F. 1/40 of its weight. Roughly, every 27° F. increase of temperature doubles the amount of water vapor the air can hold in proportion to its weight. In this way the heat of the atmosphere is self-protective, for it loads the air with water vapor, which in turn absorbs much of the heat. The latent heat is again given off on condensation. The actual amount of water vapor which the air can hold at different temperatures is shown in the following table:

A cubic foot of air can hold at

10° F	1.1	grains
20° F	1.5	"
30° F	2.1	"
40° F	3.0	"
50° F	4.2	"
60° F	5.8	"
70° F	7.9	"
80° F	10.0	"
90° F	14.3	"
100° F	19.1	"

ABSOLUTE AND RELATIVE HUMIDITY

Absolute humidity. This is the weight of water in the form of vapor contained in a given volume of air expressed in grams per cubic meter. It varies with the temperature, and it may be computed from the readings of the wet and dry bulb thermometers.

Relative humidity. Complete saturation of the air being taken as 100, any degree of dryness may be expressed in percentage. The amount of water vapor actually present, and the amount that would be present if the air were saturated, being known, the former is expressed as a percentage of the latter, giving the relative humidity. Relative humidity is greatest near the surface of the earth during night, when the temperature, being at or near the daily minimum, reaches the dew-point; it is also great in the morning, when the sun's rays have evaporated the dew, and the vapor is as yet diffused only a little way upward; and it is least during the greatest heat of the day.

The temperature of the body is regulated by the loss of heat by evaporation from the lungs and skin. If the relative humidity be increased, there will be a hindrance to the escape of water from the body; and when this condition is combined with high temperature the heat is far more oppressive than when the atmosphere is dry and allows free evaporation. On the other hand, a moist, cold atmosphere is far more distressing than when the air is dry and there is but little movement.

Clouds do not necessarily imply high relative or absolute humidity of the lower atmosphere. Rainfall also gives only a very general indication of the humidity of the atmosphere. A place with high rainfall may have low absolute and relative humidity, and vice versa; that is, a rainy district is not necessarily a damp district, so far as the atmosphere is concerned.

When the relative humidity reaches 80 to 85 per cent, moisture condenses and begins to show upon objects in rooms. This influences natural ventilation through porous building materials. Cold walls, cold windows, and cold surfaces generally condense the moisture from the air so rapidly that great difficulty is experienced in raising the relative humidity of the air of a room under these circumstances.

The most convenient of all methods for measuring atmospheric moisture is to observe the temperature of evaporation,

that is, the difference between the temperatures indicated by wet and dry bulb thermometers.

In England the relative humidity averages 75 per cent. In California it drops from 100 per cent at dawn to 22 per cent at noon. A hot wind, by increasing the capacity of the air for moisture, may also lower the relative humidity very quickly. The mean relative humidity of Denver for the year is only 42 per cent, at San Diego, on the coast, 72.9, at Los Angeles, a few miles inland, 66.6. In the heart of the Libyan desert the relative humidity may be as low as 9 per cent. At the seaside daily variations in humidity are less than inland. There may be a very great difference in the relative humidity of outside cool air and of air in a closed heated room, in that the latter may be very much dryer.

HEALTH AND HUMIDITY

The health influence of moisture in the air varies with many factors, but especially with temperature. In a general way it may be said that moist air is depressing and enervating, while dry air is tonic and stimulating; also that cold air exerts a tonic influence while warm air is more or less depressing. "The human body can adapt itself to wide variations in heat and humidity, and by means of suitable clothing and food the range may be greatly increased"; but various combinations of heat and humidity may be deleterious to health and comfort—such as cold damp air, warm moist air, and excessively dry air. Many healthful climates have a relatively high humidity, while some regions famed as health resorts are notoriously dry and arid. On the whole, frequently changing temperatures and the variable humidity of most climates are beneficial in that they stimulate the heat-regulating and nervous mechanisms of the body.

More heat is ordinarily produced within the body than is required, hence heat must be eliminated, otherwise it would accumulate and result in heat stroke. The temperature of the air, but still more its humidity, exerts a marked influence on the loss of heat.

The chief source of the body heat is the food which we eat. Approximately 80 per cent of the food we consume is used to furnish heat for the maintenance of the body temperature, while only about 20 per cent yields energy in the form of motion. Heat is lost from the body chiefly in two ways: (1)

by heat transfer (radiation, conduction and convection); (2) by evaporation, chiefly by the evaporation of the water of perspiration. The loss by heat transfer diminishes as the temperature of the surrounding air rises. The temperature of the body would rise when the atmospheric temperature went above 70° F. were it not for the fact of free perspiration. So long as the perspiration can evaporate freely the heat production and heat loss of the body are quite evenly balanced. With a high humidity, evaporation is considerably lessened and the best eliminating balance is maintained by rushing increased quantities of blood to the skin, which in turn causes an elevation of the temperature of the surface of the body, which not only increases heat loss by radiation, conduction and convection, but further dissipates heat by facilitating the evaporation of increased amounts of perspiration.

There is a neutral zone, around 68° F., at which humidity has comparatively little effect on the heat regulating mechanism of the body. Hence, if the temperature of a room is kept just about right and the occupants are sitting still, it makes little difference whether the air is humid or dry; but the fluctuation of a few degrees above or below this neutral temperature will produce definite reactions on the part of the body.

WET BULB TEMPERATURE

The individual susceptibility to temperatures depends entirely on the temperature recorded by the wet bulb thermometer, no matter what the dry bulb registers. Hill, Rubner, Nagel, and practically all authorities agree with Haldane that the air of workrooms should not exceed 70° F. by the wet bulb thermometer.

Rubner states that an untrained man can be in comfort in a temperature of 75° F. and 80 per cent humidity (wet bulb about 70° F.) only when he is quiet. At 75.4° F. and 60 per cent humidity he found a resting man lost by evaporation 75 grams of water per hour, and at 84 per cent humidity (wet bulb 70° F.) only 19 grams.

A man is much less efficient in a warm moist atmosphere; hence it is an advantage to both employer and employee that work be performed at temperatures below 70° F. by the wet bulb. At the lower temperatures work is done faster, more efficiently, and with less fatigue, discomfort and injury to health.

When air above 88° F. becomes saturated evaporation can no longer compensate for decrease in radiation, and the body temperature accordingly rises and heat-stroke may ensue. The injurious effects of the summer heat are practically always the result of combined heat and humidity.

A poorly ventilated room in which the air becomes vitiated is usually a warm moist atmosphere, and the ill effects of a vitiated atmosphere are mainly caused by the heat plus the moisture.

COLD DAMP AIR

When cold damp air is injurious the victim is usually underclad, improperly fed, or has been living an indoor life. In certain cases cold damp air must always be injurious, as, for instance, where the vital forces are at a low ebb and where there is lessened ability to make heat, such as in infancy and old age; in cases of kidney disease, where decreased evaporation of sweat means extra work for the kidneys; also in cases where there is a tendency to muscular rheumatism or other disorders of metabolism. The effects of cold damp air may be neutralized by proper clothing, by muscular activity, and, to a limited extent, by regulation of the diet.

In just what way cold damp air influences health unfavorably is not very well understood. Of course it throws extra work upon the heat-producing mechanism in its effort to maintain the body temperature; all of which involves digestion, metabolism, the circulation and the kidneys, and indirectly the nervous system. Macfie suggests that: "Dry air quickens metabolism both through its cooling and drying capacity, while damp air slows it by diminishing loss of water. It is possible that much of the harm attributed to damp and to cold is due to a depression of metabolism and accumulation of harmful waste products in the body."

A healthy man may daily move in and breathe cold damp air without suffering in health to any appreciable extent; however, it is generally believed that a cold damp air predisposes to affections of the respiratory passages, to neuritis, neuralgia, etc.

FROSTED WINDOWS

As you walk along the street during the winter you will observe that some of the windows are clear while others are covered with frost. Some of those which are clear are so

because of fans which blow the warm air of the room against them, others because of large radiators beneath them, others are clear because of double windows with an air space between them, and still others are free from frost because the air in the rooms is so dry that it has no moisture to deposit.

Janitors commonly object to humidifying the air of the room because it makes the windows sweat and frost. That may be all right from the janitor's point of view, but it is all wrong from the point of view of the people who are to breathe the air.

When air is at 72° F. and has 50 per cent humidity it is not far from right. If anything chills it to 52° F. the dew point is reached and the water of the air precipitates on the cold window surface. On a cold day the window glass is far below this temperature and it follows that if there is not water on the glass there was little in the air—too little for the health of human beings.

Of this you can be certain: the house where the windows do not sweat and frost is not fit for human habitation. The school with clear windows is wasting the taxpayers' money, the teachers' time and the pupils' health. The office with clear windows is a place where employees have more than the average of colds, pneumonia and minor infections.

When the weather gets warm sweating windows have not the same significance. At that season they mean humidity which is too high for comfort and, in some measure, for health. In midwinter beware of the house that has not frosted windows.

When a woman has bought a nice fern or other plant growing in a pot of good, black dirt she wants it to live. She places it in her sitting room and takes pride in its care. Presently she is distressed to find it dying. In her eagerness to learn she may visit a florist to discover how he succeeds in keeping his plants alive while she fails.

If the woman whose flowers die at home will go to a greenhouse she will find the temperature around 70° F., the humidity around 90, the ground fairly moist, and the plants getting some sunlight every bright day. When she goes back home she finds that her dying plant is in air which is 75° or 80° F., with a humidity of about 20, and maybe sunlight does not strike it. If she modifies the conditions her plant will live; otherwise it will die. She can bring the temperature as low as 70° F. She cannot

bring the humidity up to 90, but she can bring it up to 40 or 50, and she can give her fern some sunlight on days when the sun is shining.

WET BULB THERMOMETERS

The humidity of the air is estimated and measured by an instrument called a *hygrometer*. This instrument consists of two thermometers set side by side. The bulb of one of these is surrounded by a loosely woven wick, which draws water from a nearby cup so that from the surface of this bulb water is evaporating continuously. This thermometer is called the wet bulb thermometer and its companion the dry bulb.

From the difference between the readings of these two thermometers the humidity of the air is found on a table attached to the instrument and reproduced herewith. Thus we have two thermometers to reckon with—one of the ordinary kind, called the dry bulb, and one of a new kind, the wet bulb.

Under ordinary office conditions in January you will find that the dry bulb thermometer registers about 16° F. higher than the wet bulb, say 72° and 56° F. respectively.

In talking about temperatures we always speak of the temperature shown by the dry bulb thermometer. Many physiologists think that we ought to go by the wet bulb theremometer. Their argument is that the human body is a wet bulb and not a dry bulb machine. A man evaporates one or two pints of sweat from the skin every day, not to mention loss of moisture from the lungs. On this basis the temperature of the room is really 56° instead of 72° F., as shown by the dry bulb thermometer.

Says Dr. W. A. Evans:

> If a man were to fall in a pond and go around with his wet clothes on he would be a wet bulb. As it is he is only a slightly moist bulb. To figure him on the same basis as the wet bulb is to overstate the case. A compromise somewhere down the line, say about half way, would hit it off—such as to say that the temperature of the room for anything that is dry is 72° and for anything that is wet 56°, while for everything about as moist as a man it is 64°.

There is no doubt at all that the discomforts of extremes of temperature are better measured by the wet bulb than the dry bulb thermometer.

It is when the wet bulb thermometer shows over 70° F. that men keel over in laundries, in kitchens, and in some factories.

RELATIVE HUMIDITY TABLES—FAHRENHEIT

Temperature Readings in Degrees Fahrenheit. Relative Humidity Readings in Per Cent. Barometric Pressure 29.0″

Difference in Degrees Fahrenheit Between Wet and Dry Bulb Thermometers

Readings of the Dry-Bulb Thermometer. Difference	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
60	94	89	84	78	73	68	63	58	53	49	44	40	35	31	27	22	18	14	10	6	2
61	94	89	84	79	74	68	64	59	54	50	45	40	36	32	28	24	20	16	12	8	4
62	94	89	84	79	74	69	64	60	55	50	46	41	37	33	29	25	21	17	13	9	6
63	95	90	84	79	74	70	65	60	56	51	47	42	38	34	30	26	22	18	14	11	7
64	95	90	85	79	75	70	66	61	56	52	48	43	39	35	31	27	23	20	16	12	9
65	95	90	85	80	75	70	66	62	57	53	48	44	40	36	32	28	25	21	17	13	10
66	95	90	85	80	76	71	66	62	58	53	49	45	41	37	33	29	26	22	18	15	11
67	95	90	85	80	76	71	67	62	58	54	50	46	42	38	34	30	27	23	20	16	13
68	95	90	85	81	76	72	67	63	59	55	51	47	43	39	35	31	28	24	21	17	14
69	95	90	86	81	77	72	68	64	59	55	51	47	44	40	36	32	29	25	22	19	15
70	95	90	86	81	77	72	68	64	60	56	52	48	44	40	37	33	30	26	23	20	17
71	95	90	86	82	77	73	69	64	60	56	53	49	45	41	38	34	31	27	24	21	18
72	95	91	86	82	78	73	69	65	61	57	53	49	46	42	39	35	32	28	25	22	19
73	95	91	86	82	78	73	69	65	61	58	54	50	46	43	40	36	33	29	26	23	20
74	95	91	86	82	78	74	70	66	62	58	54	51	47	44	40	37	34	30	27	24	21
75	96	91	87	82	78	74	70	66	63	59	55	51	48	44	41	38	34	31	28	25	22
76	96	91	87	83	78	74	70	67	63	59	55	52	48	45	42	38	35	32	29	26	23
77	96	91	87	83	79	75	71	67	63	60	56	52	49	46	42	39	36	33	30	27	24
78	96	91	87	83	79	75	71	67	64	60	57	53	50	46	43	40	37	34	31	28	25
79	96	91	87	83	79	75	71	68	64	60	57	54	50	47	44	41	37	34	31	29	26
80	96	91	87	83	79	76	72	68	64	61	57	54	51	47	44	41	38	35	32	29	27

It is when the wet bulb thermometer shows under 56° F. that the throat dries out and colds are contracted, that the skin dries out and winter itch develops.

If a person can only afford one thermometer, a wet bulb will tell him more than a dry bulb; yet he ought to have a dry bulb, as it is what everybody refers to when they speak of temperatures. The fact is, everyone should have both. It would pay to save in some other direction.

PRACTICAL SUGGESTIONS

The problem of constructing buildings so as to keep the interior up to a fair degree of humidity is a difficult one. So far engineers and architects have made little practical progress toward its solution. Satisfactory devices may be had to improve the moisture in large public buildings, but these devices have so far proved too expensive for private dwellings, offices and schoolrooms.

The humidity in living rooms may be improved by growing plants. Pans or pots of water may also be placed upon the radiator, and if electric fans are utilized evaporation may be further facilitated.

On the market there are several devices which may be attached to the radiator for the purpose of allowing steam to escape. The practice is to attach this device to the far end of the radiator, the end at which the steam leaves the coils. One objection to these devices is that when several of the coils are filled with water, as often happens with poorly installed heating plants, water instead of steam escapes from the humidifier. The suggestion is that the humidifier be attached at the front end—the end where the steam enters, the end where you turn the steam on, the dry end. Generally the radiator coils have a plugged opening in this first coil. It has threads ready for the threads of the humidifier. By attaching the humidifier at this end water will not leak from it.

Humidity is also increased by keeping a teakettle boiling on the stove. Flowers growing in the living rooms also help to keep up humidity—if they are kept well watered.

Lastly comes the use of patent humidifiers, which hang on the radiators.

At low temperatures, saturated air causes a greater loss of heat by the body than dry air, and thus intensifies the sensation of cold; for moist air is a much better heat conductor.

Cold dry air is much more comfortable than air some degrees warmer, but materially moist.

In the very cold climate of eastern Siberia, the air is so dry that 50° to 60° below zero F. is no hardship, provided one wears completely dry clothing, while with moist clothing one would perish in a very short time. Some parts of Siberia are both cold and damp, and hence uninhabitable. Atmospheric moisture has, therefore, directly opposite effects; it intensifies the effects of heat and also those of cold.

We must not forget that too high humidity is very dangerous—enough is good—but too much is dangerous. It is a well-recognized fact that, during periods of heavy fogs, the morbidity and mortality from respiratory diseases are increased very greatly, and that, as the atmosphere clears, a sharp decline follows. In London, for example, the usual death rate from all causes has been known to become almost doubled during a fortnight of continued dense, smoky fog, and then to return to its normal figures with the arrival of clear weather, the increase being due particularly to bronchitis and other affections of the respiratory tract, attributed to the irritating influence of the finely divided particles of atmospheric soot and the acids which accompany them.

Sometimes we are told that humidifying the air will save coal. This is not true. Kimball says: "A simple calculation will demonstrate that, approximately, four times as much fuel is required to evaporate the water required to produce 50 per cent humidity at 68 degrees as is saved by reducing the temperature from 76 to 68 degrees."

CHAPTER LII

HOME VENTILATION

It will be found best to keep the temperature of dwellings ranging from 66° to 70° F. If the temperature is allowed to go much above 70° F. insensible perspiration is produced upon the skin, the evaporation of which produces sensations of chilliness, and the room will not feel warm until the temperature is run up to about 80° F. Had the temperature been kept down to about 70° F., much of this unconscious sweating and consequent skin-chilling would have been avoided, and the temperature of the room would have been in every way satisfactory.

The greatest error in connection with the modern hot air furnace is in placing its intake in some hallway inside of the house. While this saves fuel, it is a great cause of disease, and it would be far better to spend a little more money in warming up fresh, pure air supplied to the furnace from an outdoor shaft.

The plan most largely successful is to have the fresh air inlet near the top of the room and the foul air outlet near the bottom, both on the same side of the room. Under this arrangement, the ideal system would be either a stove or an open fireplace which would serve as the foul air outlet.

The foul air outlet should always be located near the floor and connected with either the chimney or a ventilating shaft. There should be an opening 2x12 inches for each person to be supplied with air. This should be free opening in the outlets; if grating is used, the opening must be almost twice as large.

In case of furnace heat or other methods where the air is warmed before entering the room, the outlet must always be located at the bottom of the room, but if the air is admitted cold, the outlet may be placed a little above the floor—say about four feet.

HOUSE VENTILATION

In the study of ventilation it must be remembered that cold, dry air is the heaviest, and that warm, moist air is the lightest.

When the air in a room is warmed, it expands and therefore rises; colder and consequently heavier masses of air rush in to take its place. This illustrates the blowing of the winds over vast continents, and explains the creation of unpleasant drafts in our efforts at proper ventilation.

The ventilation of a house heated by an ordinary stove, occurs about as follows: The warm air ascends the chimney, its place being taken by cold air entering through doors and windows. The staircase, if there be one, also serves as a sort of ventilating shaft, sucking up from every available source, the warm air, causing the inrush of the pure, cold air from every possible opening or crevice. It is this arrangement that causes an upward suction of basement gases—ground air. For this reason all basement floors should be covered with concrete or asphalt. The presence of human beings or the burning of lights in the room also heats the air and causes it to rise to the top of the room.

The ideal system for winter ventilation is to warm the cold air before or as it is being taken into the room. Such a system is fairly exemplified in the modern hot air furnace, when it is provided with a liberal intake for outside air.

AIR REQUIREMENTS

The air of ordinary living rooms should be changed about four times per hour, while the air of crowded business and manufacturing establishments should be changed six or eight times an hour.

Not less than three thousand cubic feet of air per hour must be provided for living rooms, offices, etc., for each person. For instance, a small room measuring ten feet every way and containing one thousand cubic feet of air, would be properly ventilated for one person if the air were changed every twenty minutes, three times an hour. If one or two gas burners were used in this room, the air would have to be changed not less than six times an hour. The art of ventilation is the process of making these air changes without producing unpleasant drafts.

The lungs throw off three thousand gallons (one hundred barrels) of poisoned air a day, every pint of which will spoil a whole barrel of pure air for breathing purposes; this, with the contamination of skin exhalations, makes it necessary to provide each person with about 750,000 barrels of fresh air

every twenty-four hours. Expressed otherwise; one and one-fourth cubic inches of oxygen is required with each breath; about one cubic inch of carbon dioxid (CO_2) with other poisonous gases is thrown out from the lungs with each breath; this pollutes about three cubic feet of air, and with twenty breaths a minute we have each person poisoning about sixty cubic feet of air a minute or one cubic foot of air a second. This furnishes a practical basis for all systems of ventilation.

VENTILATION FACTORS

The difficulty with so many systems of ventilation is that the intakes and outlets work only during one season of the year. That is, while they may work in the summer, the starting of the autumn fires entirely reverses the process, converting inlets into outlets, etc.

In ordinary dwellings, it is better to depend upon the chimney as the outlet. Even in the absence of a fire, the chimney would be a perfect ventilator, were it not for the fact that it is located usually on the outside of the house and therefore exposed to the chilling effects of cold winds. With the chimney in the center of the dwelling, it would constitute the ideal exhaust channel for proper ventilation.

Smoky chimneys are due to one or a number of the following causes: too many stoves on a small chimney; obstruction from soot; too many joints in the stovepipe; the chimney outlet too close to other buildings, or lack of cold air inlets to the room, which would enable the stove to set up a draft in the chimney.

Laying aside all the details of inlets and outlets, etc., the important thing in the ventilation of the ordinary dwelling is to have the doors and windows opened several times each day, to change the air completely; then with the provision for proper heating and allowing a reasonable amount of air to come in about the doors and windows, you will have fairly good ventilation for the average house.

VENTILATION *vs.* AGITATION

The belief is growing that it is not dangerous to rebreathe air, and the view is spreading that the hygienic value of ventilation for the purpose of maintaining a pure atmosphere in dwellings, schools and hospitals is not so great as was formerly supposed. According to this view it is more important to ven-

tilate in the interest of the heat economy of the body, by the establishment of a suitable temperature and air movement, and by the control and regulation of the humidity in the atmosphere. The established facts, that the principal causes of the ill effects of vitiated air are due more to the heat and humidity and stillness of the air than to changes in its chemical composition, have led some hygienists even to recommend rebreathing the air, provided the physical conditions are kept favorable. This is an extreme view, in which I do not concur. Because rebreathed air has not been demonstrated to be harmful is no proof that it may not be so. Satisfactory ventilation, therefore, must not only take into account the physical conditions of the air, but also demands a generous supply of fresh air in order to keep the chemical composition within reasonably normal limits.

A little consideration, however, will show that regulation of air space is by itself of little value. Unless there be movement of air, space alone is futile. However large the space may be, the air will become impure unless fresh air circulates through it, and however small the space, the air may be kept pure by sufficient agitation and circulation.

It is not alone the air space but the shape of the room that influences ventilation. It is a mistake to suppose that a lofty room is, therefore, an airy room, for a stratum of warm vitiated air soon occupies the upper portion of such space, and, so far as good air is concerned, has the effect of lowering the effective height of the ceiling to the top of the door or nearest outlet. Anyone may convince himself of this fact by getting up on a stepladder in a room with a high ceiling, improperly ventilated, and occupied for some hours. The upper stratum of air in such rooms is frequently stifling. Ordinarily 12 feet is high enough for the ceiling of school rooms, museums, hospitals, etc., and 9 feet for the rooms of private dwelling houses. Where there is little or no movement of the air it soon becomes offensive, no matter what the height of the ceiling.

Floor space is more important than height. The necessity for an abundant floor space is shown by the fact that a small inclosure with four high walls and without a roof, if crowded, speedily becomes oppressive. In fact, the four walls are not necessary to demonstrate this, for "crowd poisoning" in the open air upon a still, warm day is a common experience.

INLETS AND OUTLETS

Whether a room is to be ventilated by natural or mechanical means, proper inlets for the fresh air and outlets for the vitiated air must be provided. No general statements as to the best size and position of these openings will apply under all circumstances.

Knowing the velocity of the incoming air, the area of the inlets may be proportioned so as to permit the movement of the necessary amount of air.

Whether the air is to be admitted near the floor and taken out near the ceiling or vice versa is a question much discussed among ventilating engineers. The natural course of the warmed vitiated air is upward, and it would seem that the upward system has advantage over the downward system. However, a little study will soon convince one that if the incoming air is warm it will rise at once, and the maximum efficiency will be lost at the breathing line, which, after all, is the essential stratum of air in the room. Perhaps the best arrangement is to have the inlet above and the outlet below—both upon the same side of an inner wall. An automatic system of taking the air out of a room may be provided by placing a shaft either around the chimney flue or against one side of it. The column of heated air in the ventilating duct will rise and draw the vitiated air out of the room with which it is connected. The same may be accomplished by placing a steam jet or a gas burner within the ventilating duct to create a draft.

NATURAL VENTILATION

Wherever possible, open windows are the best and simplest means of ventilating a room. Any system of mechanical ventilation at best is costly and frequently unsatisfactory. Open windows are cheap and adequate, but the limitations and disadvantages of natural ventilation are obvious, and, therefore, we are frequently required to resort to mechanical means.

Natural ventilation may be greatly favored by simple devices. This may be demonstrated by placing a lighted candle in a bottle within a narrow neck. The flame soon dies out, but by placing a partition in the neck of the bottle, so that the products of combustion will escape on one side and the fresh air enter upon the other, natural ventilation proceeds so that the candle remains lighted. There are numerous simple devices

that may be placed at the top or bottom of windows which favor entrance of fresh air or the exit of vitiated air. One of the upper window panes may be valved or fitted with a fan to permit the entrance of fresh air or the exit of foul air.

AIR MOVEMENT

Much of the benefits of mountain, seaside and other health resorts are attributable to the breezes that blow almost continuously at such places. The health of large cities located upon the seacoast or the shores of great lakes is favored by the quantities of moving air with which they are frequently flushed. A healthful climate is always a breezy climate—within reasonable limits. Much of the benefit of driving, of fanning, and of rocking chairs is due to the motion of the air thus engendered.

If the air in a poorly ventilated room can be kept in motion, say with an electric fan, many of the ill effects of a vitiated atmosphere are thereby avoided, for the products of respiration are diluted, while evaporation and heat interchange are greatly favored. Thus, Leonard Hill placed eight students in a small sealed chamber which held about three cubic meters. He states that:

> At the end of half an hour they had ceased laughing and joking and their faces were congested. The carbon dioxid had gone up to 4 or 5 per cent. Three electric fans were then turned on, which merely whirled the air about just as it was. The effect was like magic, the students at once felt perfectly comfortable, but immediately the fans were stopped they again felt as bad as before.

CELLARS AND BASEMENTS

Basements are not favorable to healthy homes, unless well ventilated and dry. If there must be cellars beneath the house, they should be large, light and airy. Every week, at least, the cellar windows should be opened wide to allow free change of air. A good way to ventilate a cellar is to extend from it a pipe to the kitchen chimney. The draft in the chimney will carry away the gases which otherwise might find their way into the rooms above. Cellars should be kept clear of decaying vegetables, wood, wet coal and other moldy materials. The walls should be frequently whitewashed, or washed with a strong solution of copperas.

Unless the walls of a cellar or basement are made impervious,

the ground water and dampness from the soil will be sure to find its way through. Stone walls several feet in thickness are readily penetrated by moisture. The walls of basements are also kept moist by what is known as sweating, which is really condensation of moisture upon the walls from the air, due to the walls being colder than the air which comes in contact with them. The only remedy for these two evils is to make the walls of basements impervious, and to make them good non-conductors by means of air space. The walls should be laid in good cement and should be coated with cement outside as well as inside.

The floor of a cellar or basement must be made as impervious as possible. A floor of asphaltum would undoubtedly fulfill the needed condition most perfectly, but a Portland cement floor, trowled down smooth and hard, or a tile floor, is very satisfactory. "The use of a drain tile all around the building just outside and near the foot of the foundation wall is undoubtedly of great service as a means of disposing of surplus moisture in the soil, especially during and after heavy rains."

CHAPTER LIII

SUNLIGHT AND PURE AIR

The infinite liberality characterizing the sun, as it lavishes energy and pours forth heat upon the earth, is amazing. The energy exerted by the sunlight in evaporating and elevating an average rainfall on one square mile of ground, has been estimated at one hundred and eighty thousand horsepower.

It is indeed marvelous the amount of energy which the plant world is able to store from the sunlight falling upon its green leaves. A single stalk of Indian corn is estimated to sweat as much as a human being, and that is equivalent to the giving off of about two ounces of water an hour. From this it has been computed that an acre of corn, in twenty-four hours, actually sweats sixty-two and a half barrels of water.

One botanist estimates that a blade of corn in pushing its way up through the heavy clods to the fresh air and sunlight, frequently lifts a prodigious weight one hundred thousand times its own. After escaping from its dark, earthy prison, the tender little corn blade can scarcely bear up a weight only a few times its own. A single tiny root, in forcing its way through the earth, exerts a power equal to three hundred pounds pressure to the square inch. A single poplar tree exhales a barrel of water every day. A single pound of Indian corn contains sixteen hundred calories, or units of energy—enough to lift five million pounds one foot high, or one-half a ton one mile high.

SUNSHINE AND THE HOME

In the development of the modern house, with all its conveniences and splendid sanitary arrangements, altogether too little provision has been made for the admission of an adequate amount of sunlight.

The march of science has delivered us from the innumerable itches and skin diseases which were the scourge of the Middle Ages; the advent of the iron bedstead has doomed the bedbug;

modern sanitary plumbing has delivered us from sewer gas and other filth; but the scientific conquest of foul air and darkness—the problems of satisfactory illumination and proper ventilation—largely remain for this or another generation to solve. It is imperative that the southern exposure should be unobstructed, and that all living and bedrooms should be located on this side of the house, that they may be constantly flooded with the glorious sunlight.

The growing fashion of bay windows should be encouraged. The more the glass that enters into the construction of a dwelling house, the better will be the health of its occupants, and the worse it will be for any disease germ that may chance to lurk therein. The glass house is not an improbable innovation of the future. A dwelling so constructed could, by shifting blinds and rugs, be daily disinfected and sterilized from the attic to the cellar, by flushing every square foot of space with the cleansing light of the sun.

The practice of massing houses together side by side in our cities and villages, and of constructing flats, many of which admit sunlight to but a single room, is indeed pernicious. One of the sanitary laws needed most at the present time is one compelling suitable space to be allowed on the southern exposure of every human dwelling place to permit of proper illumination and daily solar sterilization.

LIGHT A GERM DESTROYER

While sunshine is indispensable to the life and health of the human race and other higher forms of life, it is important to know that this same wonderful and beneficient sunlight is almost instantaneously fatal to the vast majority of disease germs and micro-organisms which prey upon man, and, in a thousand and one ways, constantly jeopardize his health and happiness. The same ray of sunlight which carries health and physical salvation to the waning consumptive, is immediately fatal to the life of his great enemy—the tiny tubercular bacillus—the cause of the great "white plague."

Since we know that about one-quarter of the population of civilized countries is afflicted with some form of tuberculosis, how urgent it is that human dwelling places, sleeping rooms, living rooms, working rooms, etc., in fact all that pertains to the life of man, should be so arranged as to give free access to the sun's rays. How important that intelligent

human beings should utilize this wonderful agency of Nature, coming as it does with its two-fold benefaction—promoting the health of man and destroying the life of his most malignant foe—the germs of consumption and other diseases.

It is this disinfecting and germ-destroying power of sunshine that has probably saved us from a universal scourge of tuberculosis that would otherwise have resulted from the careless spitting of consumptives in public places. While thousands of innocent men, women and children, no doubt contract tuberculosis as the result of such carelessness, many thousands of others are undoubtedly saved by the efficient and constant germicidal action of sunlight in destroying untold billions of these tubercular microbes.

LIGHT A HEALING AGENT

The physiological and therapeutic action of light is just beginning to receive serious attention. We are all more or less familiar with the calming effect of the dim religious light of churches and the stimulating effect of the bright and dazzling lights of the theater. The intense light of the tropics and of high altitudes is believed in some way to bring on nervous disorders, but the relation is but imperfectly understood. Some of the ill effects of living and working-rooms, attributed to bad air and poor ventilation, are due in part to the overstimulation of excessive illumination.

The sun bath is taken by exposing the body to the rays of the sun, while the head and back of the neck are protected by cloths wrung out of cold water or ice water. It is found to be very helpful in tuberculosis, rickets, anemia, many forms of dyspepsia, and other chronic disorders. It should be begun gradually, exposing the body or a part of the body for only a few moments and increasing the time little by little, from day to day, until the body may be exposed to the sun's rays from ten to twenty minutes.

It might be well in this connection to warn the reader against unduly exposing himself, particularly the head, to the direct rays of the sun during periods of extreme heat, as there is considerable danger of sunstroke, especially if he is not accustomed to high temperatures. However, the majority of sunstrokes are due to something else besides the heat. Old age, alcohol, the excess use of narcotics, such as tobacco, a heavy meat diet during the summer, together with mental

worry or despondency, contribute largely to the mortality from sunstroke during periods of prolonged hot weather.

EFFECTS OF BAD AIR

The effects produced by an atmosphere vitiated by the breath and other exhalations from human beings may be divided into acute and chronic. The acute effects are usually lassitude, headache, vertigo, nausea, vomiting, and even collapse—in extreme cases even death. The chronic effects, so far as we know include anemia, debility, and certain disturbances of digestion. Prolonged exposure to polluted air also influences nutrition and metabolism, depresses vitality, and lowers the resistance to certain infections, especially to pus infections, tuberculosis, pneumonia, and common colds. It is often difficult, especially in the poorer classes, to know how much is due to bad air and how much to poor food, overwork, loss of sleep and rest, worry, and other inflictions of poverty.

Paul placed healthy individuals in a cabinet of 2 cubic meters' capacity where they were kept for a variable time up to four hours, and until the carbon dioxid had risen to 100 to 150 parts in 10,000—an accumulation of gaseous excretion practically never developed under ordinary conditions. In these experiments no symptoms of illness or discomfort developed so long as the temperature and moisture were kept low. Tests of the mental fatigue of these individuals gave negative results throughout, under similar conditions of temperature and moisture. Tests in a crowded schoolroom were similarly negative. Erclentz made the same observations on diseased persons. Those suffering from lung disorders, heart diseases, kidney diseases, etc., with the exception of a few peculiarly susceptible anemic and scrofulous school children, bore the highly vitiated air for hours without any evidence of bodily or mental depression.

The results were very different, however, when the temperature and moisture of the air of the cabinet were allowed to increase. At 80° F. with moderate humidity, or at from 70° to 73.5° F. with high humidity, practically all persons began to show depression, headache, dizziness, or a tendency to nausea, although the susceptibility was not alike for all.

The reason that man, as well as other animals, is able to maintain a constant body temperature when exposed to such great variations of atmospheric temperature is due not only

to the physiological mechanism which regulates heat production and elimination, but to the layers of air immediately in contact with the skin. We wear clothes to protect ourselves from external heat or cold, but still more do we wear air for that purpose. That is why very high temperatures are better borne when the air is in motion, which facilitates evaporation, than when the air is still, while extremes of cold are better borne when the air is still, for then we become clothed in a warm blanket of air.

POISONOUS GASES AND ODORS

Sewer gas, once a hygienic bugaboo, is now not seriously regarded by sanitarians. "Sewer gas" is nothing more or less than air containing the volatile products of organic decay coming from sewers and drains.

While CO_2 is the chief impurity of foul air, it is not the most dangerous. There are other gases from the animal body which are really the poisonous substances, but they are hard to detect—their quantity is small. The presence and amount of CO_2 serves as a reliable guide to the detection of these other poisonous gases. There are other impurities in the air such as coal gas, marsh gas, ammonia gas, together with various forms of dust and dirt, also animal and vegetable organisms. The standard of purity requires that not more than four parts of CO_2 should be present in ten thousand parts of air.

The odors of living rooms come mostly from human sources—such as foul breath, decaying teeth, unclean mouths, nasal catarrh, the sweat glands, especially those of the feet, and arm pits, also gases from the stomach and bowels. The decomposition of matter on the skin and also in the clothes adds a very disagreeable odor, accentuated in a warm moist atmosphere. The peculiar odor in some rooms, especially sick rooms, seems to be none of these; just what constitutes the somewhat characteristic man-smell is not known. While odors may be very unpleasant, they are not known to seriously influence health; contrary to common opinion, they are not by any means a reliable sign of danger. The presence of bacteria or dust in the atmosphere has no special relation to odors. Some poisonous gases, such as carbon monoxid, are practically inodorous.

When a room smells stuffy and close it may be taken as a

fairly reliable index that the air is vitiated; this is especially true in a clean room not complicated with odors from clothing and sources other than man. In fact, the odors observed upon entering a room from the outside fresh air often furnish better evidence of imperfect ventilation than the most elaborate laboratory tests.

GARAGE GASES

In the last generation we were taught to fear sewer gas, but of late we have come to greatly discount this fear. At the present time our most dangerous and deadly gases are to be found connected with the garage. The newspapers are constantly carrying the notice of how some well-known citizen was found dead in his garage. It all came about by starting up the engine with the garage closed. This deadly gas which is generated especially when an automobile engine is first started, is known as carbon monoxid. Under no circumstances should an automobile engine ever be started in a small garage when the doors are closed. It requires, as it were, only a whiff of this deadly gas to produce fatal results, and when it is once inhaled it is too late to go and open the garage doors. This is certainly one of the things about the modern automobile in which it pays to follow the rule of "Safety First."

This same deadly carbon monoxid may also be present in our living rooms when we use a gas stove that is not connected by means of a pipe with the chimney. It is an exceedingly dangerous practice to burn large gas flames in living rooms with the windows closed, when the gas heater has no flue to conduct these deadly fumes to the chimney.

SPECIAL TEST FOR CARBON DIOXID

The most reliable authorities all agree that the proportion of carbonic acid should never be allowed to become greater than 6 parts to 10,000 (because of its associated harmful poisons); therefore, it is important to be able to detect the presence of this gas. Fortunately, this may be accomplished by very simple means, the use of which requires only ordinary care. The materials required to perform the test are, a supply of perfectly clear, saturated limewater and four bottles or jars of different sizes, the sizes required being the following: one jar or bottle capable of holding exactly 16 ounces, or one

pint; a second holding 10½ ounces; a third holding 8 ounces, or one-half pint; and a fourth capable of holding 6½ ounces. The jars should have necks large enough to admit of perfect cleaning of the whole inside, and the greatest pains should be taken to remove every particle of dirt or dust from the inside as well as the outside, with water. To apply the test, fill the jar with the air to be tested. This may be done either by drawing the air out of the bottle through a straw or tube, or by filling it with pure water and letting the water escape. Great care should be taken in sucking the air out of the bottle that the breath be not allowed to enter. To determine the amount of carbonic acid present, use the smallest jar first. After filling it in the manner described, pour in a large tablespoonful of clear limewater. Close the bottle with a clean stopper and shake vigorously for a minute or two. If the limewater becomes cloudy, carbonic acid gas is present in the air in the proportion of 10 parts to 10,000. If it does not become cloudy, repeat the experiment with the next sized jar or the half-pint jar. If the limewater becomes cloudy in this, the proportion of carbonic acid is 8 parts to 10,000. This proportion may often be found in the rooms of dwelling houses, and sometimes in crowded streets and narrow alleys. If the limewater does not become cloudy in the jar of this size, the next size should be used in the same manner. The cloudiness appearing in this jar indicates the presence of 6 parts in 10,000. This is the largest proportion which may exist without actual danger to health. If no cloudiness appears without the employment of the largest jar, the proportion is only 4 parts of carbonic acid to 10,000 of pure air.

BACTERIA IN THE AIR

Bacteria are not found everywhere in the air; uninhabited places are quite free and the number diminishes as we ascend. Bacteria do not multiply in the air; in fact, most of them soon die, especially when exposed in dry air to sunshine. For the most part, the bacteria in the air belong to the harmless varieties, although the number and kind vary greatly with circumstances. They come chiefly from the soil and are carried into the air by the wind and traffic movements; that is, bacteria in the air are derived from practically the same sources as dust. The dangerous bacteria in the air, however, come directly or indirectly from man and some of the lower animals. It is

estimated that a person living in London breathes about 300,000 microbes in the inspired air each day.

The expired air, during normal respirations, is practically bacteria-free, no matter how many may be contained in the inspired air. The moist mucous membranes of the upper respiratory passages act as a bacterial trap. When the expired air contains bacteria it is only as a result of coughing, sneezing, talking, or other forced expiratory efforts.

The atmosphere was long regarded as the vehicle of infection for the communicable diseases. These theories, such as noxious effluvia, poisonous emanations, and infections miasmata, were all swept away by the advent of modern bacteriology.

Within recent years, we have learned that the air is not very much to be feared on account of the bacteria it may carry, except under certain exceptional circumstances. This change in our views during recent times is nowhere better illustrated than in the relation of the air to surgery. During the early days of antiseptic surgery so much fear was entertained for the bacteria in the air that Lister attempted to neutralize this danger with carbolic acid sprays; while to-day we give little thought to the air of a well-kept operating room. Instead we tie several layers of sterile gauze over the mouth and nostrils and over the head to guard against infectious particles falling from these sources.

At one time many, if not most, of the contagious diseases were believed to be air-borne; many observations are on record purporting to prove that contagium may be carried long distances through the air. With the increase of our knowledge concerning the modes of transmission of infection the list of air-borne diseases has steadily decreased.

DUST DANGERS

Dust is in reality a normal and very important constituent of the air, it exists everywhere in the atmosphere and profoundly affects some of the physical conditions of our environment. One of the most important functions of dust is to limit the humidity of the air by causing the precipitation of moisture in the form of rain, and to help control temperature by the formation of clouds, mists, and fogs. Aitken, who has made a special study of this subject, says that without dust "every

blade of grass and every branch of tree would drip with moisture deposited by the passing air; our dresses would become wet and dripping, and umbrellas useless; but our miseries would not end here. The insides of our houses would become wet; the walls and every object in the room would run with moisture." Without dust there would be no rain, no clouds, no mist, for the water vapor which condenses upon each particle of dust forms the nucleus of a raindrop. Dust disperses the light and decreases the transparency of the atmosphere, especially if the atmosphere be also humid. What is known as haze is really dust carrying a minute amount of moisture.

Most of the dust is torn from the earth by the winds; much of it comes from the carbon and other particles in smoke; considerable amounts consist of minute grains of salt derived from sea spray; and great quantities are added by volcanoes. Finally, the air contains interplanetary particles which fall through it in a constant shower. Dust particles may be carried enormous distances by the winds. Ehrenberg detected organisms belonging to Africa in the air of Berlin; and fragments of infusoria belonging to the plains of America in the air of Portugal. The smoke of the burning of Chicago reached to the Pacific coast.

The pollen of certain plants flying in the air as dust leads to hay-fever in certain susceptible and neurotic individuals.

The clouds of dust swept up by the wind from the streets of city or village are laden with the germs of disease. Dust is an enemy of human health and happiness. The germs of tuberculosis, pneumonia, and other diseases, when in this dry form, are able to live for a long period and may be blown about promiscuously, infecting large numbers of people. Public streets and highways should be sprinkled or oiled wherever possible, especially in close proximity to dwellings.

Household dust should be avoided with equal care. Especially is this true of rooms where the sunlight is not permitted to have free access. The dust of all dark rooms is extraordinarily dangerous. The old-fashioned feather duster should find no place in the home. It is a vicious practice to go about stirring up the dust by means of these feather dusters. The atmosphere is filled with dust germs, which the one who does the dusting is compelled to inhale. Furniture and wood-

work should be dusted by means of a dry or slightly moist cloth.

Carpets would belong to a bygone age—except for the vacuum cleaner. Without a vacuum cleaner, the floors should be covered with rugs, which can be frequently taken out of the house and exposed to a purifying bath of sunshine.

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